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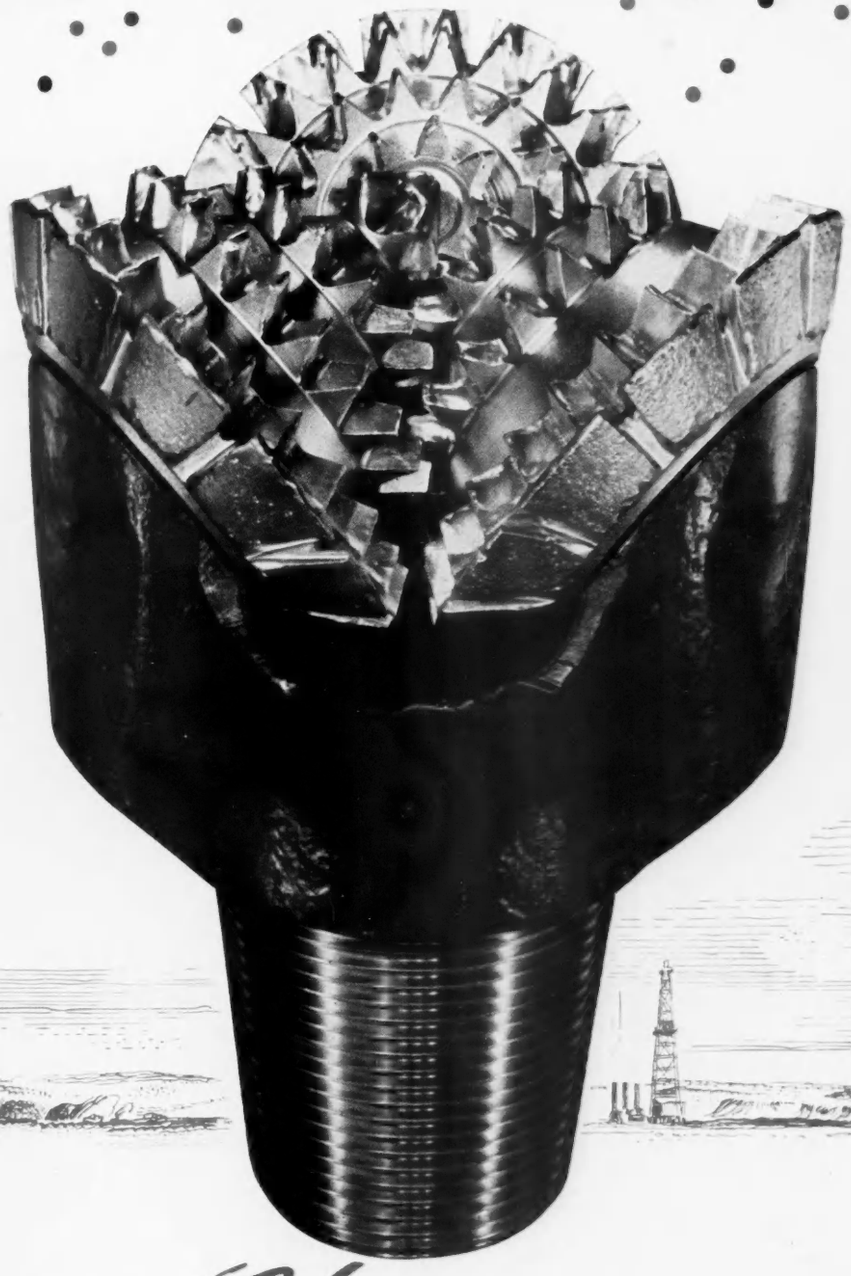

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July 22, 1946

VOLUME 122, NUMBER 4

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The OIL WEEKLY

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Looking Ahead

WITH THE EDITOR

ECONOMISTS well qualified to forecast developments in the petroleum industry made estimates early this year which have had to be revised. Demand for oils has materially exceeded most expectations.

MIDYEAR FORECAST

The more recent estimates of necessary operations for this year, made by private and government economists, will be presented in the Midyear Review and Forecast number next week.

Because this is quite an unusual year, involving many abnormal conditions and developments, these revised forecasts are essential in appraising current trends and probable trends of the latter half of year.

Detailed data will be included, showing actual domestic consumption and exports of the individual petroleum products during the first half of 1946, the rates maintained in producing and refining crude, volumes of crude and products imported, and changes which have occurred in stocks of crude and products. Forecasts on these items for the third and fourth quarters will be included in considerable detail.

The unexpected trends in demand and also other factors have affected drilling, and actual results are varying from earlier forecasts. Records on field development and wildcatting for the first half of the year therefore will have more than ordinary interest.

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New Coal Markets Sought By Research

ONE of the early results of Bituminous Coal Research, Inc., which, with the inroads being made by natural gas, is looking for new uses for coal, is a gas turbine locomotive powered by pulverized coal. Such engines will be ready for road tests in about a year, two full-size turbines already having been ordered built for installation on special locomotives.

Six major railroads and three coal-producing companies are said to be backing Bituminous Coal Research. Revelation recently was made before the Federal Power Commission's natural gas hearing that the coal industry had set aside $500,000 for research this year looking toward greater markets for coal. As pointed out by BCR's director, Dr. Harold J. Rose, this amount is only a fraction of the percentage of gross income which is being spent by other industries in research.

Any number of oil companies are spending several times this amount annually on research.

* * *

We shall win the war against the forces of inflation in the same fashion as we defeated the Japanese. Our weapons will be production; another will be our faith in each other and our willingness to work. The strongest weapon of all will be our ability to face reality—to use American common sense.

WILLIAM K. JACKSON, President
U. S. Chamber of Commerce

Labor Saving And Conservation

OIL companies will applaud any progress made by the Interstate Oil Compact Commission toward standardizing and simplifying forms and reports required by regulatory bodies of the various oil and gas-producing states.

As reported in THE OIL WEEKLY July 15, a special sub-committee of the Commission's Regulatory Practices Committee is working on this matter and a preliminary report will be submitted to the full committee at the August meeting of the Compact in Grand Rapids.

As pointed out by Sub-Committee Chairman T. A. Morgan of Kansas "simplification of forms and reports means a lot to the oil companies and if we can eliminate some forms and reports and make others uniform among the oil states, we will be making a definite contribution to conservation."

* * *

The shipbuilding activities of the nation reached prodigious proportions during the war, and by 1943 and 1944 consumed over 21 percent of all steel produced in America.

—STEEL IN THE WAR.

To The Point

WALTER S. HALLANAN, president of Plymouth Oil Company, in accepting the temporary chairmanship of the National Petroleum Council, presents very pointedly the industry's views of the new Washington setup in the following excerpts from his brief statement:

"We are anxious to have *full cooperation between government and industry* and to eliminate many unnecessary and overlapping governmental restrictions and regulations. The creation of the Oil and Gas Division in the Interior Department with a concentration of authority to deal with the petroleum industry's problems is a commendable step . . .

"That cooperation, however, must be on a basis that will at all times maintain the independence of the *industry free from government control or domination.*"

* * *

The basis of private enterprise is the right of the citizen, as an individual, or jointly with others, to set up in business for himself—to venture his personal efforts and capital; to own, use, and risk the mechanical means of production. The reward of success is profit, and the penalty of failure is the loss of what has been ventured.

—Proceedings of International
Business Conference, 1944

Revised Concepts Of Oil Discovery

CALIFORNIA geologists—and subsequently others in this area—are revising their concepts of what it takes to make a "favorable" oil reservoir. Currently, in four fields in that state, commercial quantities of oil are being produced from the "fracture-permeability" basement schists where earth movements and other causes have left numerous cracks and openings into which the oil has migrated and become trapped by the impermeable layers overlying these metamorphic rocks. As early as 1937, this type of reservoir was first noted, again in 1944, and during 1945, became of imminent importance on the West Coast. These facts are clearly presented by William Ross Cabeen and Harold H. Sullwold, Jr., in their article, "Possibilities of Basement Production in California," page 17.

Theirs is an article that will be read with interest throughout the oil industry.

Formerly, drilling operations ceased when basement rocks were encountered. Today, their presence brings about additional possibilities from the geologist's standpoint, for to continue to drill may make the difference between a producer and a dry hole. The solution to this problem, as hundreds of subsurface problems have been solved, lies in research, study and experimentation. There is no doubt that this subject will become the topic of many huddled discussions in geological circles for some time to come. As more information is known about this type reservoir and how it came to be, hope for additional reservoirs in aging fields may increase. The search for oil may be carried deeper and deeper into the impermeable rocks below known sedimentary reservoirs to bring about additional reserves.

Undoubtedly, skepticism will arise, but it must be admitted that the possibilities of this type reservoir have already been proven in California.

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The Week's News

THE Senate took up consideration of the controversial tidelands resolution which Senator Pat McCarran hopes to pass in time to prevent a probable pocket veto by Truman. Story below.

Interdepartmental Committee—Representatives of government departments and agencies handling oil held their first meeting Friday. This group will work in conjunction with the new National Petroleum Council. Story below.

Texas August Allowable—August production in Texas will be cut below the July figure but is above the Bureau of Mines estimate, according to allowables just announced. Page 13.

Natural Gas and FPC—Natural gas industry spokesmen feel that it has "made its case" in the current hearings and have shown that there is no necessity of amending the Natural Gas Act to expand FPC powers. Page 11.

Big Inch Offers—Seven offers to buy and three to lease Big Inch pipe lines have been made to WAA. The deadline is next week unless House effort to defer prevails. Page 10.

Mineral Leasing Changes—The House last week approved the Hatch-O'Mahoney bill which seeks to encourage development of public lands. Page 12.

Ohio Gas Producers—A record attendance prevailed at the annual meeting in Granville of the Independent Gas Producers Association of Ohio. Page 10.

Changed by Reorganization—Changes in government handling of leasing of public lands resulted from the Truman reorganization plan which became effective last week. Page 12.

Expanded Oil Compact—States where oil production prospects are regarded as favorable may be taken into the Interstate Oil Compact by terms of a change which is being considered. Page 10.

Rubber Plant Disposal—WAA doesn't appear to be in a rush to dispose of copolymer and butadiene plants although Congress' 30-day waiting period has expired. Story below.

Price Control—Senate and House conferees at the weekend were battling over provisions of the new price control bill, the exemption of petroleum being one of the bones of contention. Page 10.

Barkley to Fight Tidelands Measure

The Senate late Friday took up the tidelands resolution, with Senate leaders predicting that two or three days might be required for its disposition.

The resolution, declaring title to the tidelands to lie with the states, already approved by the House, was brought upon the second attempt made within the week by Senator Pat McCarran of Nevada, whose first try was blocked by Majority Leader Alben W. Barkley of Kentucky on the ground that other legislation, on the "must" calendar, should be disposed of first.

Barkley, who had explained he had no desire to prevent the Senate from voting on the question, announced that he was opposed to the resolution and would fight it.

Because of the pendency of the government's suit in the Supreme Court, it is expected that President Truman will veto the resolution if it is sent to him. It was for this reason that McCarran was insistent on bringing it up for consideration, since if it was passed in the final hours of the session the President could defeat Congress's attempt by "pocket veto." This would be accomplished by a mere refusal to sign it, any legislation not approved within ten days after the adjournment of a session automatically failing.

WAA Not Rushing Disposal Of Synthetic Rubber Plants

Although the 30-day waiting period has expired, War Assets Corporation will take no immediate steps to dispose of the copolymer and butadiene plants which it reported to Congress last month it proposed to sell or lease.

Under the law WAA is required to file reports on certain surplus plants costing the government in excess of $5 million, and give Congress 30 days in which to express its views before they are put into effect. The 30-day period on the rubber plants expired July 17.

A resolution instructing WAA to hold the plants until six months after the submission of a report by the Director of War Mobilization and Reconversion with respect to the establishment of a national rubber program was introduced by Senator Joseph C. O'Mahoney of Wyoming and approved by the Senate, an unsuccessful effort was made to bring the resolution up in the House last week, consideration being blocked when Representative Francis E. Walter of Pennsylvania demanded an amendment be included blocking disposition of the big inch pipe lines.

While failure of the House to pass on the matter within the 30-day limit leaves WAA technically in the clear, officials decided to hold up any further action toward disposing of the rubber plants until it is definitely shown that the House is not going to act. It was explained that there is no hurry, since it was not planned to ask for bids on the plants until toward the end of the year, and a few days delay will make no difference.

Portugal Petroleum Imports Approaching Prewar Figures

Petroleum imports into Portugal are rapidly approaching prewar rates, the Department of Commerce has reported. Imports, which amounted to 217,010 metric tons (1,519,070 barrels), dropped to as low as 42,776 tons (299,430 barrels) in 1942, but had rebounded to 109,625 tons (767,365 barrels) in 1944 and last year reached a total of 182,634 tons (1,278,430 barrels), it was stated.

The 1945 imports included 26,820 tons (187,740 barrels) of crude oil, 44,089 tons (308,620 barrels) of gasoline, 33,550 tons (234,850 barrels) of kerosine, 6322 tons (44,250 barrels) of lubricating oils and 71,156 tons (498,100 barrels) of gas oil and fuel oils.

Inter-Agency Oil Group Holds Meet

Members of the interdepartmental oil committee, which will be a counterbalance to the National Petroleum Council in an advisory capacity to the Interior Department's Oil and Gas Division held their initial meeting with Acting Director Ralph K. Davies and other division officials July 19.

The meeting was merely organizational and exploratory, and will be followed by a survey of all government petroleum and gas activities to see how responsibilities are divided, etc.

It was explained that the interdepartmental committee will not seek new ways in which to inject government control into the oil situation, and it was indicated that its activities will go no further than the letter of the President's directive to undertake the coordination of government oil operations.

Members of the interdepartmental committee are Charles B. Rayner, petroleum adviser to the State Department; Colonel Gustav Vogel, executive officer of the army-Navy petroleum board, representing the War Department; Captain B. B. Biggs, deputy executive officer of the Army-Navy petroleum board, representing the Navy Department; Nelson Lee Smith, vice chairman of the Federal Power Commission and in charge of the natural gas investigation; Barry Magdoff, special assistant to the Secretary of Commerce and Raymond E. Kerr, director of transportation and fuels branch, Civilian Production Administration.

Deadline Set for Filing Claims of War Losses

The State Department is urging the immediate filing by oil companies and other American nationals of information relating to war losses or damage to properties located in Italy, Bulgaria,

Roumania and Hungary, a deadline of July 26 having been set. On the basis of these data will be developed the amount of reparations to be considered in the drafting of peace treaties at the 21-nation peace conference which opens in Paris July 29.

All nationals with property in the four countries are urged to furnish a brief statement regarding such losses or damage, even though the information may have been submitted heretofore to a government agency.

Such statements should show the name of the owner; nature and location of property; estimated amount of loss or damage (in U. S. dollars); cause of loss or damage, whether as a consequence of military operations, requisition, seizure as enemy property, looting, removals, etc., and nationality of authorities causing the loss or damage. Claims arising out of nationalization programs should not be filed.

Statements should be submitted to the Legal Adviser, Department of State.

Independents Praised by Martin at Ohio Meeting

A record group (350) attended the 14th annual meeting of the Independent Gas Producers Association of Ohio at Granville July 17.

Philip Faine, secretary, reported that the ever-present tax situation was being closely followed. He called attention to the subsidy program, which is in doubt but said he felt that the refiners would adjust crude prices in the event the OPA was abandoned. He also stressed the responsibility of all independent operators to conduct their business so that there would not be any reflection on the body as a whole and so as not to cause either state or federal regulations.

Clyde M. Foraker, Columbus, Ohio; Ralph Burns, Sistersville, W. Va.; William A. Port, Pittsburgh; Willard Shrider, Newark, Ohio; and George Weaver, Newark, Ohio, were named directors. Officers will be elected later by the directors.

General Edward Martin, Governor of Pennsylvania, the evening speaker, covered the important part played by men from Pennsylvania and Ohio in the early progress of the nation and the oil industry. He called attention to the need for independent operators as producers and as men of initiative who would drill the majority of the wildcats.

Mineral Resources Meeting Postponed Until Next Year

Inability to arrange adequate hotel accomodations has caused the American Institute of Mining and Metallurgical Engineers to postpone the World Conference on Mineral Resources and the Institute's 75th Anniversary celebration until the week of March 17, 1947. The World Conference was originally scheduled to have been held in New York City, September 16-18.

Institute officials declared that the presence in New York during the week of March 17, 1947, of so many foreign scientists and engineers, and the large number of members of the Institute indicating a desire to attend, has led the board of directors to decide to hold, during the same week and at the same place—Hotel Waldorf-Astoria—the annual meeting of the AIME.

No essential change will be made in the character and scope of the sessions as originally planned, AIME officials declared. Foreign delegates will be welcome and the international aspect will be stressed.

The World Conference on Mineral Resources will open Monday, March 17, 1947, and will close with a banquet on the night of March 19. Technical sessions for the annual meeting will be held the remainder of the week.

Seven Would Buy, 3 Lease Big Inch

The War Assets Administration at the end of the week reported it had already received seven proposals to purchase and three to lease the lines.

Four of the proposals were for use of the lines, in whole or in part, for oil, two provided for their use for gas and one contemplated removal and relocation of one of the lines as an oil carrier.

The agency also has received twelve letters of consideration or intent to buy, several of which specified that firm bids will be filed before the closing date, and five letters of consideration or intent to lease

Representative Francis Walter of Pennsylvania last week asked that an amendment be incorporated in the resolution calling for a six-months deferment in the disposal of copolymer and petroleum-butadiene plants under which the pipe lines also would be held.

Walter thinks that the report filed by WAA some weeks ago under which it plans ot proceed with disposal of the Big Inch lines was merely a "general report" and not such a detailed report as required by law.

It was rumored that some of the major companies have become interested in taking over the pipe lines as a result of the activities of groups outside the oil industry looking toward their acquisition. WAA had no comment.

House Group Is Fighting Decontrol of Petroleum

House and Senate conferees on price control extension were still sparring Friday over the terms of a bill which, it was agreed in all quarters, President Truman would not sign unless substantial modifications are adopted.

The House group was fighting the arbitrary decontrol by the Senate of petroleum and foods, and efforts were being made to reach a middle ground.

The House was seeking a bill under which the decontrol of commodities would be determined by a board, with little prospect that the Senate would recede from its demands that oil, meats, and other specified products be permanently released.

Oilwell Contractors Make Grant for Drilling Research

A grant of $6000 has been made the University of Texas by the American Association of Oilwell Drilling Contractors for use during the coming year in furthering industrial education and research in oilwell drilling.

A committee on research and education of the Contractors' Association is chairmaned by J. E. Warren of Midland and includes Howard Holmes, Dallas; Travis Kerr, Oklahoma City; C. W. Alcorn of Houston and L. W. Sullivan of Tulsa.

Texas work will be developed in cooperation with the trade and industries division of the State Board for Vocational Education. In other oil-producing states the work will be carried on in cooperation with state and local industrial education authorities.

Experimental work has been completed at Odessa, Kermit and Wichita Falls. Plans for the coming year call for establishment of centers at Rangely, Colo.; Great Bend, Kan.; Oklahoma City and Tulsa, Okla.; Hobbs, N. M.; Shreveport, La.; and Kilgore, Beaumont, Houston and Corpus Christi, Texas.

The first phase of the program will consist of field research and training in the use and control of drilling fluids. Drilling equipment and drilling practice are scheduled later.

Petroleum Division AIME Nominees Are Announced

John R. Suman, vice president, Standard Oil Company (New Jersey), and Charles V. Millikan, chief production engineer, Amerada Petroleum Corporation, have been nominated for three-year terms as members of the AIME board of directors.

Howard C. Pyle, vice president, Bank of America, Los Angeles, was nominated as chairman for 1947 of the Institute's petroleum division. John H. Murrell, general manager, DeGolyer & McNaughton, Dallas, and Lloyd Elkins, Stanolind Oil & Gas Company, Tulsa, were nominated as regional chairmen of the petroleum division.

Proposed for membership on the executive committee of the petroleum division were John E. Sherborne, Union Oil Company of California, Los Angeles; Stuart E. Buckley, Humble Oil & Refining Company, Houston; William W. Porter III, consulting engineer, Los Angeles; William V. Vietti, chief petroleum engineer, The Texas Company, Houston; Dr. Joseph B. Umpleby, petroleum engineer, Dallas, and William B. Berwald, petroleum engineer, Ohio Oil Company, Findlay, Ohio.

Peckham Appointed

Brigadier General Howard L. Peckham, wartime chief of the fuels and lubricants division in the Office of the Quartermaster General, has been appointed Air Quartermaster on the staff of the Commanding General of the Army Air Forces.

Undesirability of Expanding Natural Gas Act Believed Shown at Hearings

Representatives of the natural gas industry participating in the Federal Power Commission's natural gas investigation this week assayed their position and expressed confidence that the Commission had been convinced of the lack of necessity and actual undesirability of amendment of the Natural Gas Act to expand its powers.

Their belief was based on a number of developments occurring during the hearings which opened June 17 and are expected to wind up within the next week or ten days, among them:

1. The admission, outright or tacit, of spokesmen for the coal and railroads industries and labor that they were asking arbitrary end-use restrictions on gas to protect their own economic position rather than because of any actual need of conservation.

2. Statistics showing that known gas reserves are sufficient to meet demands for more than 30 years, with further substantial expansions anticipated.

3. Definite indications that atomic power plants will be able to provide the entire fuel supply at low cost for many localities throughout the country before natural gas reserves are exhausted.

4. Testimony that natural gas is not an irreplaceable resource and that commercial production of gas from coal is an economic possibility of the not distant future.

Members of the industry committee, now presenting their case, and observers as well, expressed the opinion that the Commission would deem it unwise to impose end-use restrictions on the use of gas or attempt to extend its authority to its production.

Last week, the Commission was told bluntly that in some quarters the FPC "has given the impression of considered solicitude for the coal and railroad interests, with which it has no administrative relationships and has often appeared to be acting "in the unappointed capacity of umpire in the industrial competition between the coal and gas industries."

Fears Obstructions

E. Holley Poe, consultant appearing as lead-off man for the Natural Gas Industry Committee, declared the industry is not afraid of the competition from coal, but does fear the "possibility of FPC-imposed obstructions to the operations of natural economic forces that should be permitted to work themselves out freely in the direction of the largest measure of service at the lowest average cost.

"Congress never has established an authority for any agency of government, whereby the natural resources of the country, individually or collectively, would be so restricted that their development for the highest advantage of our society would be impaired in any way," Poe declared.

"I do not believe Congress ever intended some of the results which have developed in the past administration of the Natural Gas Act. Our apprehensions will continue until we have assurances that the procedures under which the act will be administered in the future will more nearly conform to the intentions of Congress as they are widely understood in a simple reading of the act itself, devoid of any judicial or administrative interlineations," he said.

Poe commented that since 1942, the coal, railroad and labor groups have filed 1570 interventions in connection with 63 applications for natural gas service expansions.

Concern over the supply of gas, he said, cannot be justified on the grounds of the needs of those groups to retain their present position, but only "when the reserves curve shows a continuing tendency to dip toward the consumptive curve."

DeGolyer's Testimony

The prospects for future discoveries of large reserves of gas are bright, according to E. DeGolyer, of DeGolyer and MacNaughton. While the January 1 known reserve was over 144 trillion cubic feet, a figure of 200 trillion is considered more advisable in the broad consideration of national planning, he said.

DeGolyer emphasized the part which the oil industry is beginning to play in connection with gas. Until recently, oil operators were little concerned with gas and many gas shows were plugged and abandoned because of inaccessibility of markets or low prices.

"This practice is not likely to continue in the future," he explained. "If gas is encountered it will be exploited because additional markets and uses for gas have been and will continue to be developed."

Deeper drilling will bring about the finding of additional oil and gas, he predicted, and such activities during the past decade have resulted in the discovery of a greater proportion of gas to oil than before, raising the likelihood that the ratio will continue to increase with continued drilling to even greater depths.

The commission was given a preview of the atomic future by Dr. E. R. Gilliland, professor of chemistry at Massachusetts Institute of Technology, who predicted that within half a century a substantial part of the fuel load of the country would be met by atomic energy.

Uranium's Possibilities

Decomposition of one pound of uranium will give a heat production equal to 3 million pounds of coal or 36 million cubic feet of natural gas, and would be economically possible at a decomposition cost of $4000 to $8000 per pound. Crude uranium currently costs less than $20 a pound, he said, and the metal "is almost as plentiful as copper, twice as plentiful as zinc and four times as plentiful as lead," assuring adequate supplies for a long era.

The possibility of atomic energy being able to compete with industrial power at present prices is very real, he told the Commission.

Even if atomic energy is not developed for many years, however, the nation need not fear a lack of gas because of the definite possibilities of producing gas from coal economically, it was asserted by W. K. Lewis, professor of chemical engineering at the Massachusetts Institute of Technology.

With continued research, Lewis said, the cost of synthetic gas might easily be brought below the delivered cost of natural gas in many areas.

"The gas reserves represented by the coal deposits are enormous—giving about 2500 years supply," he testified. "Even after allowing for large scale manufacture of synthetic liquid fuels also from coal and assuming continued use of solid coal at the present rate of consumption, there is coal enough in the United States to supply gaseous fuel for a thousand years or more."

Lewis estimated that a plant operating on bituminous coal with a consumption of 5600 tons daily would produce 39 million cubic feet daily of synthetic gas, 8900 barrels of synthetic gasoline and 2800 barrels of synthetic diesel oil and alcohols. With coal at $2.50 a ton and assuming a value of 25 cents per thousand feet for the gas produced, the gasoline would cost about 7¼ cents per gallon.

Since petroleum supplies expectedly will become shorter as time goes on, Lewis pointed out that development of coal-based synthetics will go on regardless of the gas situation.

McHugh Reappointed Head Of Louisiana Conservation

Joseph L. McHugh's reappointment as Louisiana's Conservation Commissioner has been confirmed by Governor Jimmie Davis for the duration of Davis' term.

Joseph L. McHugh

McHugh who has been in office since 1940 has been connected with the oil industry since 1920, having served numerous oil companies in various capacities.

McHugh's announced goal is to eliminate all casing-head gas waste, to promote the highest possible secondary recovery, and to provide for the cycling of gas whenever feasible. He said 52 percent of all gas produced is being utilized and estimates that this figure will jump to 85 percent in the next six months.

McHugh commended the attitude taken by the Louisiana oil companies, and he attributed the success of the gas waste prevention program to their cooperation.

Encouragement of Exploration Sought As House OK's Hatch-O'Mahoney Bill

Without debate, the House last week unanimously approved the Hatch-O'Mahoney bill to encourage development of the public land, providing for a 12½ percent on oil or gas produced from new discoveries and modernizing the administrative provisions of the Mineral Leasing Act.

Because of amendments written by the House Public Lands Committee, the measure was returned to the Senate. The changes in the bill, incorporated at the suggestion of Secretary of the Interior Krug, would limit the 12½ percent royalty more specifically to leases on lands whose development is clearly extremely hazardous, and protect against combinations of lessees to take over more than the statutory maximum acreage in common ownership by providing that any interest held as a tenant in common shall be charged against the total acreage permitted to be held by a person under the act (THE OIL WEEKLY, July 8).

Without going into detail regarding the provisions of the legislation, Representative Frank A. Barrett of Wyoming, the only member to speak on it, told the House it is designed to provide an incentive for bringing in new oil deposits, particularly by independent operators who, he pointed out, have been responsible for about 85 percent of all the great oil discoveries.

Barrett declared that it is estimated it will be necessary to drill approximately 400,000 wells in the next 20 years, and possibly as many dry holes, at an estimated cost of $40 billion and, for that reason, he said, "It is imperative that the United States provide the same incentive for the future as that provided during the war, and give a flat 12½ percent royalty, which is the same as practically all the other landowners receive."

Mineral Leasing Affected By Truman Reorganization

President Truman's reorganization order providing for the transfer to the Interior Department of jurisdiction over the mineral leasing of lands held by the Department of Agriculture and merging the General Land Office with the Grazing Service became effective last week as a result of the refusal of the Senate to concur with the House in disapproving the plan, but another of his three reorganizations, calling for the merger of all housing agencies, was killed.

All three of the plans were disapproved by the House.

Officers New Dallas Nomads Chapter

Shown here are officers of the Nomads Chapter recently organized in Dallas with 36 charter members. Top panel, left to right: C. A. McClelland, International Derrick and Equipment Company, regent; Arthur A. Burrell, The Cooper-Bessemer Corporation, vice president; Noble A. Endicott, Continental Supply Company, president. Lower panel: S. S. Parker, National Tank Company, regent; Robert B. Moody, Jarecki Manufacturing Company, assistant sergeant-at-arms; and Eric G. Schroeder, Lucey Products Corporation, treasurer. Officers not shown include L. A. Little, Lufkin Foundry and Machine Company, secretary; and R. J. Baurer, Gardner-Denver Company, sergeant-at-arms. W. G. Green from the Tulsa chapter and chairman of the national board of regents, presided at the installation of the Dallas officers, Shep Miers, secretary to the board of regents, assisting.

Oil Compact May Expand To Include Prospect States

To be considered at the meeting of the Interstate Oil Compact Commission, August 8-10 in Grand Rapids, Mich., is a proposal to expand the commission to include as associate members states having no oil or gas production but where there appears to be good prospects for such production.

The matter was studied by the Compact's executive committee at a recent meeting in Oklahoma City, but final decision will be made at Grand Rapids.

The state of Georgia has requested associate membership and Earl Foster, Compact secretary, is of the opinion that other states will seek such affiliation.

Compact committees will meet August 8 at Grand Rapids. The engineering committee will breakfast at 7:30 a.m., other committees meeting at 9 a.m. Joint committee meeting and roundtable discussion is scheduled for that afternoon.

Open forum discussion, scheduled for August 9, afternoon, will be devoted to the Compact's statistical program, Anglo-American Oil agreement, conservation payments or subsidy for stripper wells, etc.

Resolutions committee has been appointed comprising Sidney Latham, Texas, chairman; Clarence T. Smith, Illinois; F. R. (Gus) Frye, Michigan; Gov. Andrew F. Schoeppel, Kansas, and Hiram M. Dow, New Mexico.

Clarence T. Smith, Flora, Ill., attorney and independent oil operator, has assumed his duties as Illinois representative on the Compact Commission. He was appointed by Gov. Dwight H. Green.

Smith was Illinois representative on the Compact Commission in 1941-43, resigning because of ill health and personal business.

Truman Signs Bill to Sell Government Royalty Crude

Legislation authorizing the Secretary of the Interior to sell government royalty oil to refineries without their own sources of supply was signed last week by President Truman.

Under the measure, the secretary could sell the oil to independent refiners by private sale at not less than the posted price, upon showing that the purchaser was without an assured supply of crude of his own. Where two or more refiners sought oil from the same field, the supply could be prorated between them.

Signs Labor Bills

Governor Jimmie Davis of Louisiana has signed two labor bills which will become law effective July 31. One, the "Little Case" bill, makes labor and management equally responsible for the fulfillment of contracts between them, and the other prohibits the payment of unemployment compensation benefits to strikers.

August Allowable in Texas Below July Figure; Big Cut in West Texas

A reduction of 52,505 barrels for August was ordered for West Texas District 8 last week by the Texas Railroad Commission, the reduction being made in an effort to alleviate transportation and storage congestion in the area. The State allowable was set at 2,308,828 barrels daily, 98,829 barrels below the July figure.

Underproduction is estimated at 144,302 barrels, or 6.25 percent, which would result in production of 44,526 barrels more than the Bureau of Mines estimate. Natural gasoline and distillate production is estimated at 179,205 barrels, for a total of 2,343,731 barrels of all oils, or 223,731 barrels in excess of Bureau of Mines figures.

Other reductions ordered would cut Southwest Texas by 13,131 barrels, the Gulf Coast by 25,448 barrels, East Central Texas by 3800, and North Texas by 2540 barrels.

West Texas, which produced 27 days in July, will produce only 24 days; however, fields generally will produce 26. East Texas will produce 21 days and the Panhandle is exempt.

The only basic changes in allowables were made for the Smith Point, Anahuac and Sugarland fields where MERs have been revised. Smith Point was increased from 2538 to 3788 barrels daily. Anahuac was reduced from 41,538 to 34,440 and Sugarland was reduced from 9231 to 5740 barrels.

Nominations for August totaled 2,435,256 barrels, 50,285 barrels below July, and 315,256 barrels above the Bureau of Mines estimate. Indicated demand for Southwest Texas crude was up 7522 barrels, East Texas (outside) up 5126 barrels, East Texas up 1076, North Texas up 1550. Demand for Gulf Coast crude was down 16,849 barrels, West Central Texas down 2465, and West Texas down 46,763 barrels.

Companies generally asked that present allowables be maintained, however, Humble Oil & Refining Company and Gulf Oil Corporation indicated that they would be satisfied with cuts in fields where the MERs have been revised downward. Republic Oil and Refining Company, Crown Central Petroleum Corporation, American Liberty Pipe Line Company, Eastern States Petroleum Company and Sinclair Refining Company reported shortages of crude.

Humble asked that West Texas fields to which it is connected be reduced to pipe line capacity.

A Sinclair representative thought that the 4.3 pounds per square inch increase in the weighted average bottom hole pressure in the East Texas Field during June justifies 22 instead of 21 producing days for August.

Operators and royalty owners in the Carthage field attacked United Pipe Line Company and The Chicago Corporation for an alleged discrimination in gas takes from wells. They asked that the Commission restore proration for the Hill zone with a daily limit of 20,000 cubic feet and that ratable take be enforced in the field. Commissioner Thompson pointed out that ratable take will go back into effect August 1, and a hearing will be held August 13 on the whole problem.

The next statewide hearing has been scheduled for August 16 in Austin.

Crude Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED July 20	July 13
Alabama	1,200	1,200
Arkansas	73,900	73,700
California	885,700	881,500
Colorado	36,200	35,850
Florida	200	200
Illinois	206,900	208,350
Indiana	19,300	19,700
Kansas	275,650	271,750
Kentucky	31,150	31,250
Louisiana	383,050	382,750
North Louisiana	82,400	82,100
South Louisiana	300,650	300,650
Michigan	50,500	46,500
Mississippi	64,250	67,250
Missouri	100	100
Montana	25,900	25,750
Nebraska	750	750
New Mexico	99,400	99,400
New York	11,300	9,500
Ohio	7,900	8,500
Oklahoma	383,700	384,850
Pennsylvania	37,850	31,750
Tennessee	35	35
Texas	2,227,550	2,227,550
Tex. R. R. Comm. Districts:		
Dist. 1—South Central	19,500	19,500
Dist. 2—Lower Gulf Coast	158,100	158,100
Dist. 3—Upper Gulf Coast	511,350	511,350
Dist. 4—Southwest	228,000	228,000
Dist. 5—East Central	44,150	44,150
Dist. 6—East Texas Field	315,000	315,000
Dist. 6—Rest of Northeast	107,800	107,800
Dist. 7B—West Central	32,000	32,000
Dist. 7C—West	28,000	28,000
Dist. 8—West	569,150	569,150
Dist. 9—North Central	129,300	129,300
Dist. 10—Panhandle	85,200	85,200
West Virginia	7,750	8,600
Wyoming	110,900	111,750
Total United States	4,941,135	4,928,535

Total stocks, foreign and domestic, July 13, as reported by the Bureau of Mines were 222,859,000 barrels with a daily average production of 4,934,000 and runs to stills 4,875,000.

IPAA Sessions Are Scheduled for Cheyenne

The executive committee of IPAA, with state vice presidents of the association, will meet at the Plains Hotel in Cheyenne, Wyo., July 30-31. On the day prior to the meet in Cheyenne, a luncheon will be held in Denver for IPAA officials.

Plans for the annual meeting to be held October 28-30 in Fort Worth, will be completed at the Cheyenne meeting.

Humble Midland Shipments To Cease at End of Month

Termination of the government subsidized car shipments of West Texas crude and exhaustion of storage room held by some pipe lines were the main factors in bringing about the scheduled 52,505-barrel reduction in the Permian Basin's output effective August 1.

Rail movement of crude, currently averaging 37,000 barrels daily, from Humble Pipe Line Company's rack at Midland, will be terminated at the end of the month when the transportation subsidy ceases.

In excess of 3 million barrels of sour crude that could not have been marketed otherwise, due to insufficient pipe line capacity, have been freighted since April 17 to refineries of Humble and Eastern States Petroleum Company on the Texas coast to manufacture fuel for the Navy.

Even the cutback may not be adequate to avoid moderate pipe line proration in a few areas, but pipe line companies are reluctant to take such measures in view of the highly competitive market now prevailing.

Although a pipe shortage has hampered the Permian Basin pipe line program, two companies—Gulf and Magnolia—are expected to boost pipe line capacities slightly late in August.

Tank Sales to Canada Give New Mexico Relief

Market relief for surplus crude production in the Artesia district of New Mexico is being provided through tank car sales to a Canadian refinery, and other tank car movements are promised.

Continental Oil Company is selling 2000 barrels daily of its purchases in Eddy County and from the Maljamar field, Lea County, to British-American Oil Producing Company's Canadian plants at the posted price, plus gathering and loading tariffs. This oil is loaded at Continental's Artesia refinery rack on the Santa Fe Railroad. The transportation tariff is more than double the crude price posting. Another Canadian refining concern is negotiating for crude by tank cars from the area.

Petroleum Products and Refining Company, owner of a refinery at Prewitt, N. M., is seeking an adjustment in tank car rates to enable it to purchase from 5000 to 1000 barrels daily in the Artesia area, which has been accumulating back allowable for months because production has exceeded the local market outlet.

Luncheon for Davies

Ralph K. Davies, about to leave Washington after more than five years as deputy petroleum administrator and acting director of the Oil and Gas Division, last week was overtaken by an unusual fete—a farewell luncheon tendered him by the oil-press writers

Davies was presented with a number of gifts, including a suitably inscribed wallet, and, after he confessed he did not know what he was going to do, a ouija board was given him to give him the answer.

Penrose-Skelly Field Gathering Lines Built

Magnolia Pipe Line Company is installing a 3-mile 4-inch crude gathering system to handle controlled sweet crude production in the Brunson and Eunice townsite sectors of the Penrose-Skelly field, Lea County, New Mexico An 80,000-barrel capacity steel tank is being moved from the Vacuum field to Eunice in order to store its gatherings.

The company is reported to have projected an extension line from its Fullerton field, West Texas, station via the Nelson field to link the above system, else its gatherings can be routed via other lines to Wink, Texas, where the oil can enter Magnolia's system.

Magnolia Petroleum Company has 4 Ellenburger producers in the Brunson field, and has completed the first of a number of Yeso lime wells scheduled for within and adjacent to the Eunice townsite.

Cunningham Field Pipe Salvaged for New Line

Cities Service Gas Company is now taking up its natural gas line to the Cunningham field of Kansas, and will salvage the pipe for construction of the company's proposed line from the West Edmond Field to Drumright, Okla. The Cunningham line was constructed in 1940.

Construction on the West Edmond line is scheduled to begin about August 1, and is set for completion in November. It will be 64.5 miles in length, of 12-inch capacity. At the same time the company will start work on a 6.5-mile, 16-inch line from the Cities Service, storage field at Craig, to the Flavin station in Johnson County.

Coastal Crude Reported Bought by Cities Service

Continental Oil Company has suspended operations at its 10,000-barrel capacity crude skimming and cracking plant near Baltimore, Md. This plant was operating largely on coastal Louisiana crudes delivered by tanker, and it is reported that the company has contracted to sell this crude to Cities Service Oil Company until February 1, 1947.

Deliveries to Cities Service will average 12,000 barrels daily in July, then increase to 14,000 barrels daily during August, September and October. Commitments during November and December will average 10,000 barrels daily, and 17,000 barrels daily in January, 1947.

Products Line Planned to Minnesota from Whiting

Construction of a 662-mile pipe line to carry finished petroleum products to Minneapolis and to Moorhead, Minn., across the Red River from Fargo, N. D., has been announced by Standard Oil Company (Indiana) and authority to construct certain buildings connected with the line has been granted by CPA.

The line, to carry products from the company's refinery at Whiting, Ind., in addition to Minneapolis and Moorhead, will have other terminals at intermediate points.

Ten-inch pipe will be used for most of the distance, the rest to be 8-inch. Several pumping stations will be built. Construction will start in a few weeks with delivery of products scheduled early in 1947.

Wells in Slaughter Field Are Given New Connection

Unconnected wells having an allowable of 950 barrels daily in the northwest extension of the Slaughter field, West Texas district, will be given direct pipe line outlet by South Plains Pipe Line Company. This firm is delivering 3300 barrels daily to Stanolind Pipe Line Company's 16-inch carrier, and 3100 barrels daily to a refinery at Levelland. The company will take over a 5-mile 4-inch relay line built by Sunray Oil Corporation, and lay about 10 miles of 4-inch discharge line in providing connections for the isolated leases, which have been dependent upon tank truck sales to the Levelland refinery.

Gulf Refining Company is delivering 5000 barrels daily of Keystone-Ellenburger sweet crude during July to Magnolia Pipe Line Company, which received the oil at its Midland terminal.

National Tube Planning Increased Pipe Output

An expansion program which will increase its production of small size steel pipe and tubing by 320,000 tons a year, National Tube Company has announced.

The company's Lorain, Ohio works will be upped 15 percent to produce 150,000 additional tons annually and its Gary, Ind., plan 170,000 more tons annually. Both projects will be completed within two years.

Holding Company Exemption Asked for Gas Companies

Legislation which would exempt the transportation and distribution of natural gas produced as an incident of the production of petroleum from the provisions of the Holding Company Act, designed to stimulate oil production, was introduced in Congress last week by Senator Elmer Thomas of Oklahoma.

To be known as the "Natural Gas Conservation Act of 1946," the bill provides that holding company restrictions shall not apply to any person engaged in the transportation of natural gas, nor to any gas utility company engaged in the distribution and sale of natural gas produced by it or an affiliate as an incident of the production of petroleum or otherwise, nor to any gas utility company engaged in whole or in part in the distribution and sale of natural gas produced as an incident of the production of petroleum.

The legislation would remove some of the handicaps now surrounding the marketing of gas produced in connection with oil, through the gas utility companies.

Progress Being Made on Monterrey Gas Line Project

Gas Industrial de Monterrey, Mexican company, is reported negotiating with steel companies of the United States for the purchase of pipe to be used by the company in laying a natural gas line from the Rio Grande River to Monterrey.

The line, 140 miles long, will be part of the international pipe line from Hidalgo County, Texas, gas fields to the Mexican city. Reynosa Pipe Line Company will lay 30 miles of line from the gas fields to the border and will export up to 50 million cubic feet of natural gas daily after completion of both lines.

The route of the Mexican part of the line is not yet complete as purchase of rights-of-way is still in progress. Reports from Mexico City say that the company wants to purchase all rights-of-way itself and does not want to ask the government to expropriate land for the route.

The cost of the Mexican project is estimated between 16 million and 18 million pesos ($3,200,000 to $3,600,000).

East Ohio Company Gets Permit to Construct Lines

Construction by East Ohio Gas Company of a 144-mile pipe line, 95 miles of 18-inch from Pipe Creek, the Hope Natural Gas Company terminal on the Ohio River, to Austintown Junction, Ohio, and 49 miles of 20-inch line from the latter point to the Cleveland suburbs, was approved last week by FPC. The project, which is estimated to cost $4,620,000, will enable East Ohio to receive increased supplies from Hope to meet consumers' requirements. The new line will have an initial capacity of 119,000,000 cubic feet daily.

To provide the additional service, Hope was authorized to construct 64 miles of 12¾-inch loop line and 24 miles of 20-inch loop line, together with 55 miles of 12¾-inch line from its Jackson compressor station to Wyoming County, W. Va., together with a new dehydration plant and a total of 3000 horsepower additional compressor capacity, at an estimated cost of $5,327,500.

Oklahoma Will Support Hugoton Gas Lines Plea

The Oklahoma Corporation Commission will petition to intervene in the Federal Power Commission hearings for two proposed natural gas pipe lines from the Hugoton field to northern terminals. The Commission will support Mid-Continent Natural Gas Transmission Company on a proposal to build a pipe line from the Kansas sector of the field to the Mesbia iron range of Minnesota, and the Michigan-Wisconsin line, from the field to the Detroit area.

Mid-Continent recently amended its application to the FPC for extension of the line from near Hugoton to Kansas City, Mo., to include an unserved market in Eastern Ohio, then north into Minnesota. Hearings on the application have not been held.

Plans for Creole's Model City in Western Area of Venezuela Revised

Creole Petroleum Corporation has announced revised plans for the construction of its refinery and model city on the Paraguana Peninsula on the shore of Amuay Bay in Western Venezuela. Cost of the program has been raised from $50 to $65 million because of higher expenses involving labor and materials, according to W. J. Connelly, Creole's manager of manufacturing.

Connelly said the date for starting work will be announced "just as soon as we have received from the people of this area final approval of needed facilities." He added: "we hope the people will realize the great benefits which will derive to them from our program."

The refinery, which will be the company's third in Venezuela, will have a daily capacity of 60,000 barrels of refined products of all types. It is expected to go on stream late in 1947.

The refinery will be about 150 miles from La Salina, center of Creole's production activities on Lake Maracaibo, and construction in connection with it will necessitate building of an entire new model city. The company now has two groups of experts in the field surveying problems for the housing of 10,000 workers and the erection of 2000 new homes for refinery personnel. Connelly said the building of the model city, which will engage 4000 workers, "will be without precedent in the oil history of South America." It may be necessary to go as far as 75 miles to obtain water.

Amuay Bay forms an excellent deep water harbor and the terrain is well suited to the construction of the refinery.

Gaspe and Continental Agreement on Operations

Authorization of an agreement between Gaspe Oil Ventures, Ltd., of Montreal, Quebec, and Continental Petroleums, Ltd., was confirmed at a recent meeting of Gaspe stockholders, covering the following points:

Gaspe immediately acquires a 50 percent interest in all gas and oil production of Continental's No. 1 well on the Galt Brook Dome, Gaspe Peninsula, in return for which Gaspe supplies funds not exceeding $150,000 necessary to complete drilling of the well from its present depth of 2137 feet to a maximum depth of 8000 feet.

Gaspe receives the right to participate on an equal basis with Continental in all gas and oil production of any further wells drilled on Galt Brook Dome, which embraces 17,698 acres held by Continental; in consideration for which Gaspe agrees to furnish 50 percent of funds necessary to drill additional wells.

Gaspe pointed out that before drilling can be resumed on the No. 1 well, road and camps must be reconditioned, drilling equipment which is rented from Imperial Oil, Ltd., must be installed and water intrusions shut off. All this work is in progress.

Drilling is progressing on Gaspe's Venture 1 Well on the Galt anticline, approximately 4 miles north of Continental's test.

U. K. Petroleum Imports Less Than for Year Ago

United Kingdom imports of crude and products during the first quarter of 1946 totaled 28,307,117 U. S. barrels, against 32,298,428 barrels in the same period last year, while exports of products were 191,255 barrels against 7802 barrels, the Department of Commerce reported.

In imports, declines were registered in aviation gasoline, from 7,447,814 barrels in the 1945 quarter to 399,400 barrels this year; regular gasoline, from 12,800,915 to 12,763,675 barrels; and fuel and diesel oils, from 5,862,646 to 4,988,654 barrels, while increases were recorded in mineral spirit, from 245,613 to 302,001 barrels; kerosine, from 1,534,924 to 2,942,441 barrels; lubricating oil, from 470,277 to 503,515 barrels; gas oil, from 2,779,766 to 3,091,655 barrels; and crude petroleum, from 1,156,473 to 3,315,776 barrels.

Gemmer Heads Carter's Foreign Geophysical Work

R. W. Gemmer, assistant chief geophysicist in charge of foreign geophysical operations of The Carter Oil Company, will take charge of both foreign and domestic geophysical operations of the company. H. W. Brown will continue as Gemmer's assistant, and will have charge of foreign geophysical work. P. L. Lyons, office computer, will become technical supervisor with general supervision of computing and interpretations of geophysical work in the field and division offices.

R. W. Gemmer

H. W. Brown

Estonia Shale Oil

Estonia produced about 800,000 tons of shale in 1945 from which about 100,000 barrels of shale oil was obtained, according to a recent announcement by the Estonian Minister for the Shale Oil Industry. He estimated that by 1950 the yield of shale oil would be about 1 million barrels.

California Company Will Drill Saudi Arabia Wells

Brown Drilling Company, Long Beach, California, has been awarded a contract to drill several wells in Saudi Arabia for Arabian American Oil Company. The first contractor's crew ever to drill in the Near East left Los Angeles last week by air for their new job. E. C. "Ned" Brown, who headed the party, said it is expected the group will remain in the Near East for several years.

Most of the drilling equipment, consisting principally of two diesel rigs and cantilever type masts, was shipped out by boat in May.

Those departing were J. M. "Doc" Wilson, superintendent; E. E. Dawson, petroleum engineer; Glen Robinson, tool pusher; K. L. Bourdo, maintenance foreman; J. Y. Lempke, A. D. Dale and Leon C. Mounts, drillers; and Louis Dunn, B. Gent, Calvin Lawson, and Carl Teeters, derrickmen.

Thirty Arabs will be employed to a rig, Brown said.

Deep Tests Being Planned For North Tunisia Section

The Syndicat d'Etudes et de Recherches Petrolieres on Tunisie is drilling a wildcat oil test at Zaouia, some 5 miles southeast of Hadjeb-el-Aioun, according to a report from Tunisia. Earlier tests southwest of Bizerta and south of Ferryville were abandoned at 2500 feet and 7500 feet in 1936 and 1940, respectively. These earlier tests are credited with having logged some shows of gas.

Further reports indicate that the Societe de Recherches et d'etudes Minieres en Tunisie, in which the Tunisian Administration and several industrial companies are interested, is preparing to drill several deep tests on geological and geophysical structures. The sites of these tests are reported as in Northern Tunisia, north of Souk-el-arba, and in the southern part of the country near Tebaga, in the region of Medenin.

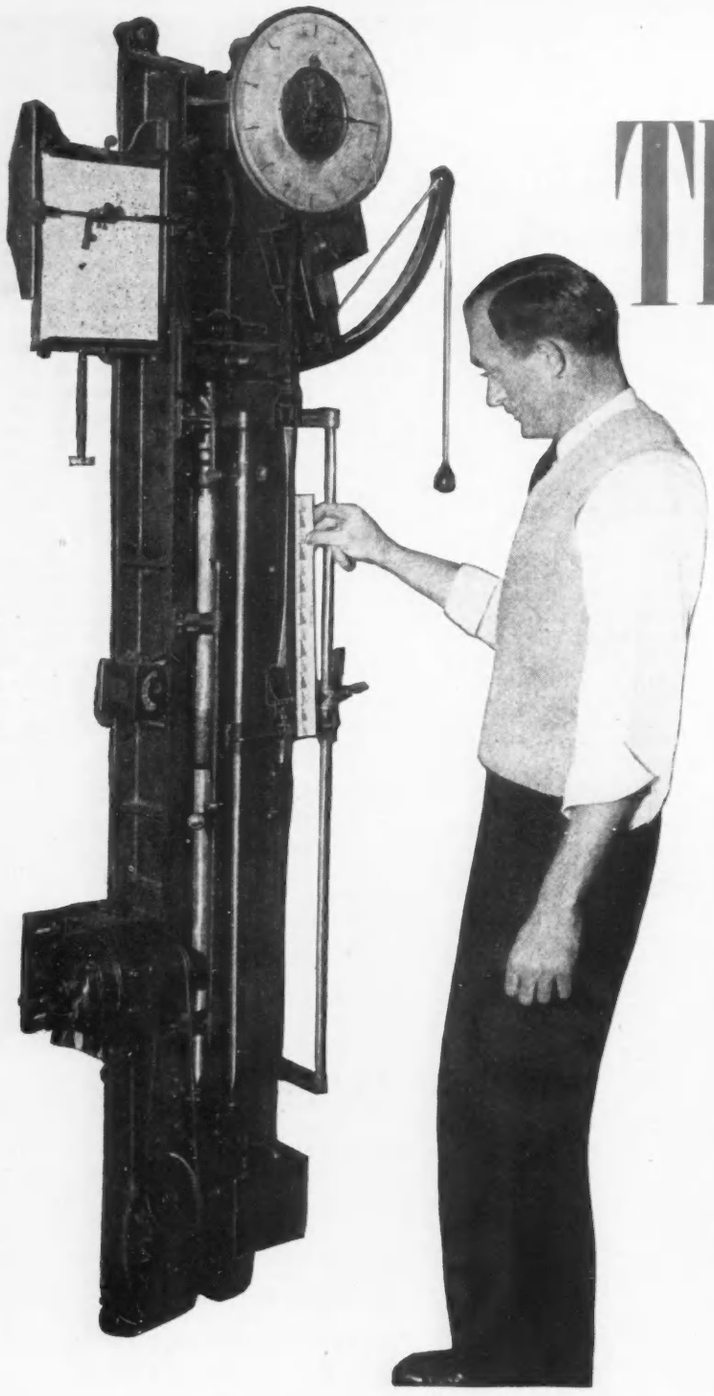
Standard Subsidiary Takes Over Big Tract in Alberta

Standard Oil Company of California, through its new subsidiary, Caloil Corporation, has taken over 142,000 acres in the central plain oil fields of Alberta, Canada. The area is bordered on the east by the Saskatchewan border and on west by the Wainwright oil field.

The Dina district, adjoining the new field, just across the Saskatchewan border, has produced minor amounts of oil while Wainwright produces 1000 barrels monthly.

Colombian Official Injured

Dr. Hernando Madera P., head of the Fiscalization Section, Ministry of Petroleum, Colombia, was seriously injured recently in an automobile accident north of Bogota. His wife also sustained slight injuries. Their companion in the jeep, which turned over on a mountain road, was killed instantly.



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California Basement

PRODUCTION POSSIBILITIES

By WILLIAM ROSS CABEEN and HAROLD H. SULLWOLD, JR.

IN THE last few years California operators and geologists have had to revise their concepts of what necessarily constitutes a petroleum reservoir. They are discovering that an oil accumulation does not necessarily require Tertiary sands before it can be considered seriously as a goal in prospecting. All that is required is a rock containing voids (of course in a suitable source and trap-environment). That this reservoir rock can just as well be fractured basement rocks has been very adequately demonstrated by the more or less accidental discovery of several prolific pools. The result is that wells which would formerly have stopped at the basement are now carried on down to make a complete test of the location. Fracture permeability type reservoirs have in the past been a rarity in California, the notable exceptions being in the Santa Maria area.

The first true schist production in California was in the western part of the El Segundo pool where production in fractured schist overlain by impermeable shale was demonstrated in 1937. In spite of the fact that schist wells came in for initial productions of up to 4500 barrels per day, fractured basement rocks were not accepted as "testworthy" reservoirs except in the immediate vicinity of El Segundo, where several outlying schist tests were drilled. The next important basement production discovered and the first to start some really active thought of basement production possibilities throughout the state was in the Santa Maria Valley field in 1944 where prolific basement production was established in the fractured partly metamorphosed "Knoxville" formation of Uppermost Jurassic Age. However, in this case a dozen Knoxville wells of several independent operators were producing their maximum allowables of 300 barrels daily alongside of very poor Miocene producers, some as low as 5 barrels per day, before it was generally accepted by many operators in the field that the oil was coming from below the Miocene. Many of these Knoxville wells took over 1000 feet of penetration and found oil in cores at the bottom demonstrating that the oil was not just in a weathered zone at the surface. In the summer of 1945 basement reservoirs gained new importance when an independent operator in the Edison field in the San Joaquin Valley accidentally penetrated schist about 100 feet and noticed oil in the cores. The well was tested and completed in the schist and flowed clean oil. This precipitated a very active drilling campaign that still is in progress with about 90 wells now producing exclusively from fractured schist.

Meanwhile, in May, 1945, a well on Terminal Island in the Wilmington field demonstrated the productivity of the schist in that area in a test which flowed at a 400 barrel per day rate, beaned back, from a 130-foot schist interval. Several schist wells have since been put on production in Wilmington but development has been slow, partly because of several failures in downstructure wells, and partly because a new deep zone above the schist has been more attractive and logically the first to be developed.

Definition of Basement

It may seem odd to those unfamiliar with California geology that Mesozoic rocks are regarded as basement. However, the great Nevadan orogeny of Upper Jurassic time with its granitic batholithic intrusions and accompanying metamorphism served to eliminate the oil possibilities of all previous sediments so affected. As far as is known now, all the oil producing districts are underlain by either these products of the Nevadan orogeny or by rocks of the Uppermost Jurassic Franciscan-Knoxville series. The latter are sandstones, shales, cherts, lavas, ultra-basic intrusives (locally altered to serpentine), and schists. Schists predominate south of Santa Maria. In addition to the Nevadan and Franciscan-Knoxville types there may be one or more other groups. The basement complex in the long, narrow area labelled "older (?) intrusives and metamorphics" (see map, Figure 1) is regarded by Taliaferro[3] as being considerably older than Nevadan, though this view is subject to some dispute by those students who think it is of the same age. In the Santa Ana mountains east of the Los Angeles area there are slates containing Triassic fossils, and in the Santa Monica Mountains at the north rim of the Los Angeles Basin there are phyllites of probable Triassic age. These latter two outcrop areas are probably associated with the Nevadan orogeny. Exposed on Catalina Island, in the Palos Verdes hills west of Wilmington, and in cores from deep wells in the Western Los Angeles Basin are schists of debatable age. They are very similar lithology to Franciscan schists, but are not associated with other Franciscan lithologic types. They have been named Catalina metamorphic facies of the Franciscan formation, but can not be traced directly, or even indirectly, to true Franciscan. All these rocks have long been regarded as basement and until recently were not seriously considered as oil reservoir rocks.

Recent demonstrations of production from a new type of reservoir have caused revision of earlier concepts

Significant basement outcrop areas are shown on the accompanying map (Figure 1). Hypothetical distribution of the various basement types beneath the overlying sedimentary blanket also are indicated. Only locally (as in the faulted borders of "older (?) intrusives and metamorphics") can the boundaries of these areas be sharply delineated due to the thick cover of Cretaceous and Cenozoic deposits. For example, there is no control whatsoever regarding basement lithology in the Ventura Basin where three provinces appear to join beneath an extremely thick sedimentary section (estimated at 40,000 to 70,000 feet). Likewise the eastern border of the Franciscan-Knoxville series is based on very little control. Cores from the basement in the Chowchilla gas field in Madera County are schists closely resembling meta-sediments outcropping to the east, and basement cores east of Bakersfield are of the Nevadan type. Serpentine was cored at Greeley west of Bakersfield, but we do not know its petrographic affinities.

In the Los Angeles area, schist cores of Franciscan type have been taken in El Segundo, Wilmington, Torrance Playa del Rey, Dominguez, and Inglewood (?) fields in the western part of the basin. Somewhere beneath the basin is a contact between Franciscan and granitic-slate types. The authors have arbitrarily drawn this contact along the Newport-Beverly Hills fault zone.

El Segundo

This pool, located on the west side of the Los Angeles Basin, is the only California basement pool described in the literature. A buried schist ridge is overlain by Miocene and Pliocene shales and sands whose attitude reflects the topography of the ridge to a diminishing degree upward until the structure vanishes in the lower Pliocene. A mantle of schist conglomerate covers part of the area in varying thicknesses up to 100 feet. This is the producing zone in the eastern part of the field. This unit is thickest in low area on the schist "high" and is absent on the highest area in the west-

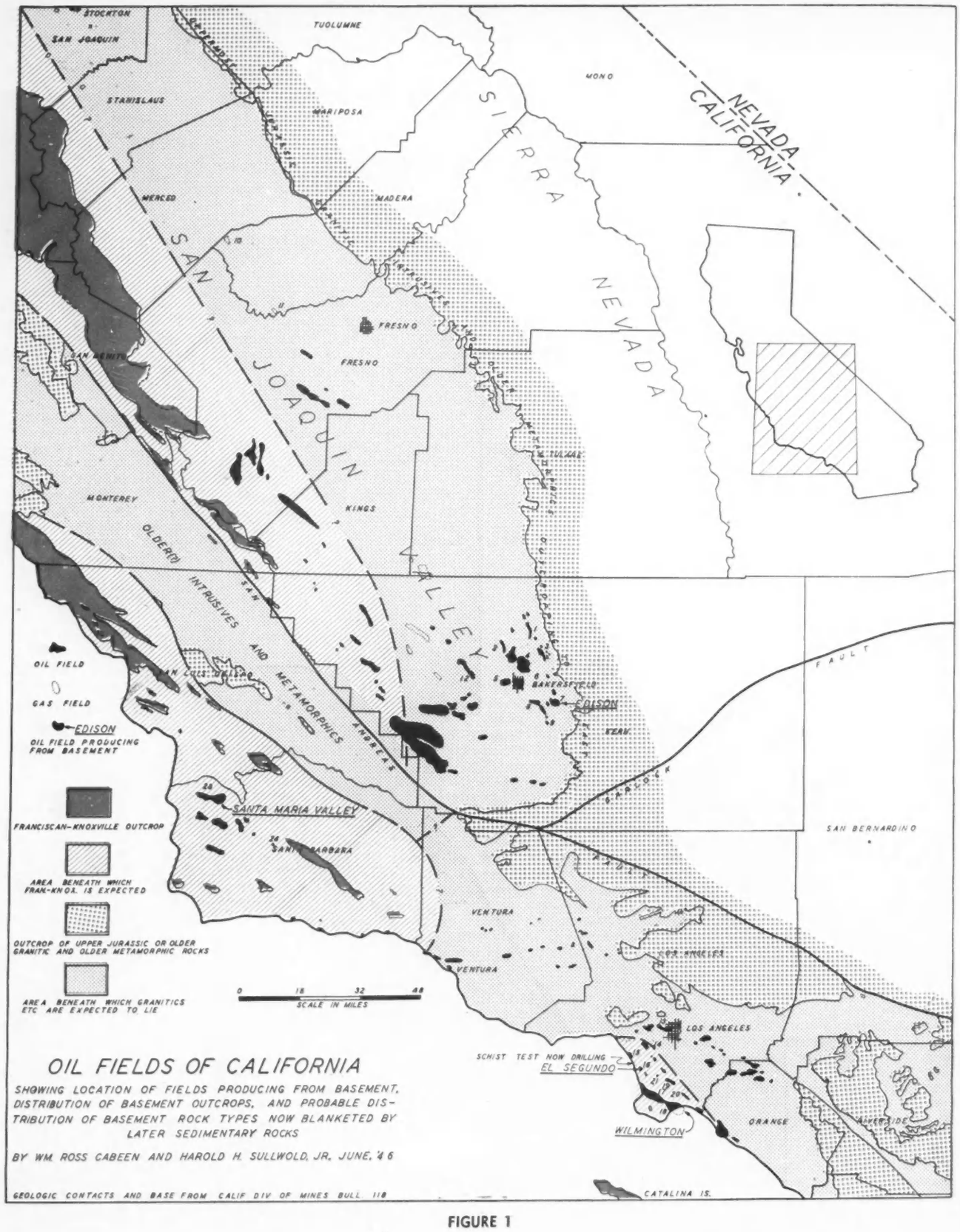

FIGURE 1

ern part of the field. In this "bald headed" area early wells coring for the schist conglomerate recovered true schist with oil in fractures and cavities. Operators had the courage to set casing on the schist, and many of these schist wells came in for 4000 to 5000 barrels daily.

The field was discovered by the Republic Petroleum Company's El Segundo 1 which was completed on August 24, 1935, flowing an estimated 400 barrels daily of 28° gravity oil from 7402 feet with 72 feet of conglomerate and 20 feet of schist penetration. Development was continued until September, 1938, when there were 68 producing wells and 8 dry holes defining a producing area of 950 acres. The large majority of wells were producing from conglomerate, but many had both conglomerate and schist open, and 6 or 8 wells in the western area had schist alone. By the first of the year, 1946, 34 wells were still pro-

ducing and the total cumulative production had reached 11,539,000 barrels of oil and 8,044,000 MCF of gas.

In this field the basement is schist considered as belonging to the Catalina metamorphic facies of the Franciscan series which outcrops in Catalina Island and in the Palos Verdes hills 8 miles south of the field. The Franciscan formation is now regarded as Upper Jurassic in age, but since a definite correlation has not been established between the Catalina metamorphics and the true Franciscan north of the latitude of Santa Barbara, it is quite possible that the basement rock in this field is older than Upper Jurassic. The schist here is fractured and pitted. Porter feels that both hydrothermal waters and weathering have contributed to the formation of the small cavities, many of which are lined with crystals of pyrite and calcite. The permeability of the schist zone is locally much greater than that of the poorly sorted conglomerate as evidenced by analyses of cores and comparison of initial production rates. The average schist penetration has been about 100 feet in the western area, but some wells took in up to 300 feet. No bottom water was noted, but water was found at down-dip edge locations where the schist was in contact with wet conglomerate. The schist pool can be classified as A/B-Ia or a convex trap modified by permeability changes in an anticlinal environment (classification of O. Wilhelm). Inasmuch as the reservoir is an irregularly convex trap overlain by impermeable shale surrounded at lower elevations by saturated schist conglomerate containing the same type of oil as the schist, it seems obvious that the oil in the schist conglomerate zone merely kept migrating up-dip into the schist fractures and cavities and finally was trapped under the Miocene shale dome. As in most reservoirs depending on fracturing, the success of the wells depends a good deal on luck in hitting the zone where the fractures are open. In some cases 100-barrel per day wells offset wells capable of producing several tens of times that amount.

In general it can be said of the El Segundo field that the schist zone development has just about broken even from an economic standpoint. This is due in part to the abnormal close spacing of schist wells (about 5½ acres) for the depths drilled (7000 feet, ±) and in part to the small total porosity and volume of oil in spite of the high permeability and initial rates of production.

Santa Maria Valley

This field was the first to demonstrate the presence of oil at considerable depths into the basement and to start an interest in basement possibilities elsewhere. The field was discovered in 1934, and up until the discovery of basement production early in 1944, had produced nearly 40 million barrels of oil from about 300 wells scattered over 6000 acres from various Miocene zones, particularly the fractured Monterey chert. The geology of this Miocene pool has been adequately described in the literature. A southwest-dipping monocline in the Miocene is truncated by an unconformity and overlain by more gently dipping Pliocene sediments, resulting in a wedge trap (see Figures 2 and 3). The Miocene producing formations are lying on a hard basement which formerly was called Franciscan but which

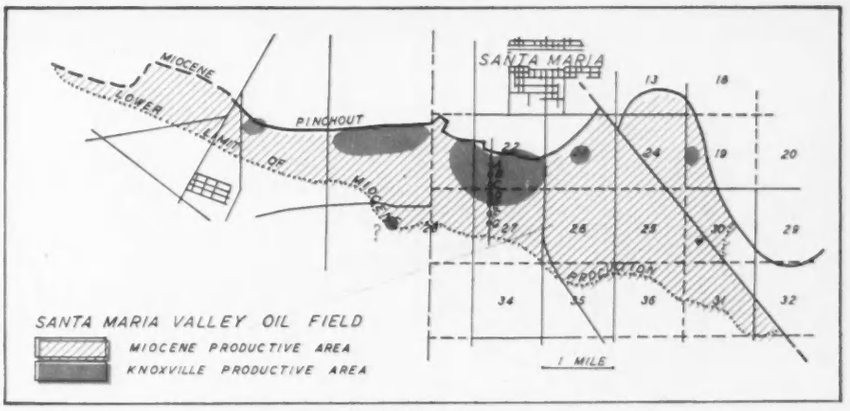

FIGURE 2

now is called Knoxville, on the basis of recently acquired coring information, particularly the recovery of the fossil, *Aucella piochii*. According to the most recent authoritative discussion (Taliaferro[3]) the Franciscan and Knoxville are a continuous series of Tithonian age (late Upper Jurassic). It is composed of slightly altered, extremely hard, gray, pyritiferous, calcareous sandstones, slickensided dark gray to black shales (locally called the "slick black"), and green serpentine dikes and sills. Fractures are numerous and are locally filled with calcite. Where open they contain oil and water. Locally there is a thin very permeable zone 20 to 30 feet thick at the top of the basement which may represent a detrital mantle of weathered material.

Most Miocene wells stopped at or above the basement but some took in the "detrital" zone and a few took in a small penetration of "Knoxville." This was not due to a belief that they contained oil, but just a case of drilling a little too deep and no necessity of plugging back. In December of 1942, W. R. Gerard spudded in his Acquistapace 1 on a lease quit-claimed by a major oil company in the north central part of the field offsetting a 15-barrel per day well. The well was intended to take in the same zone as the easterly offset well but was on the up-thrown side of a fault and went 90 feet into the basement due to the lack of technical advice on the job. It came in as a 10,000 MCF per day gas well, but soon went to oil and flowed 2500 barrels per day of clean 18.5° gravity oil. Seven-inch casing was set at 3988 feet, top Miocene at 4010 feet, top "detrital" zone at 4270 feet, top "Knoxville" at 4295 feet, total depth 4385 feet. Slotted liner was landed with the entire interval below the shoe open to production. Casing pressures were far in excess of the bottom hole formation pressures of the depleted Miocene productive zone, and oil production was beyond the wildest dreams of the operator.

At this time the PAW was enforcing 20-acre spacing in the Santa Maria Valley field and Gerard used his second well as the wedge in getting the spacing requirements cut down to 10 acres. This took a considerable amount of time, and the authors were called upon to prepare a report on the production possibilities of the lease advocating closer spacing. It became apparent from a study of the behavior of Acquistanace 1 that the excess pressure and production was coming from elsewhere than the nearly depleted Monterey, and it was recommended that Acquistapace 2 (one location west of No. 1) be carried into the basement deeper than No. 1 as an exploration well of the basement. In March, 1944, the second well was completed for 2800 barrels daily from a total depth of 4805 feet with a penetration of 415 feet of Knoxville plus the usual Miocene zones. This well was offsetting a 5-barrel per day Miocene well on the west. There were still some who doubted, but rapid development and completion of excellent producers in the vicinity of the discovery well, particularly at up-dip locations where the chert zone (main Miocene productive zone) was completely wedged out, established the Knoxville definitely as an important reservoir.

Subsequent development has resulted in over 40 Knoxville wells, some with over 1200 feet of Knoxville penetration. Most of them have some Miocene open along with the Knoxville, but the Knoxville has been isolated and found productive alone. Some of the wells came in flowing as in the Gerard area, but most are brought in on the pump for an average of 200 to 400 barrels daily. Development has disclosed the unpredictable nature of this type of reservoir where productivity depends on the vagaries of fracturing. There is a productive area of 250 acres in the north central portion of the field surrounded by poor wells and failures and a sprinkling of fair to good wells along the north edge of the field. Several dry tests have been made at various places within the field and beyond the northern edge. It seems that at these locations the fractures are filled with calcite rather than oil, or the wells may have been drilled in areas where a thick unit of the "slick black" shale intervened between the Miocene source and the Knoxville sandstone. In some cases a marked improvement has been noted after acidizing "tight" wells. The reservoir has not been clearly delimited by drilling, but the early flurry following Gerard's exceptionally good completions has slowed down as a result of the drilling of several poor wells. It is probable that the reservoir is sealed up-dip by a lessening of porosity and permeability due to lack of open fractures. This lessening of porosity may be due to the larger degree of mineral deposition in the fractures in pre-Pliocene time when the Knoxville was exposed to erosion, and ground waters were allowed free access, whereas the area to the south of the Miocene pinch-out line was still protected by its Miocene cover. Some of the poor wells are in depleted Miocene areas in which

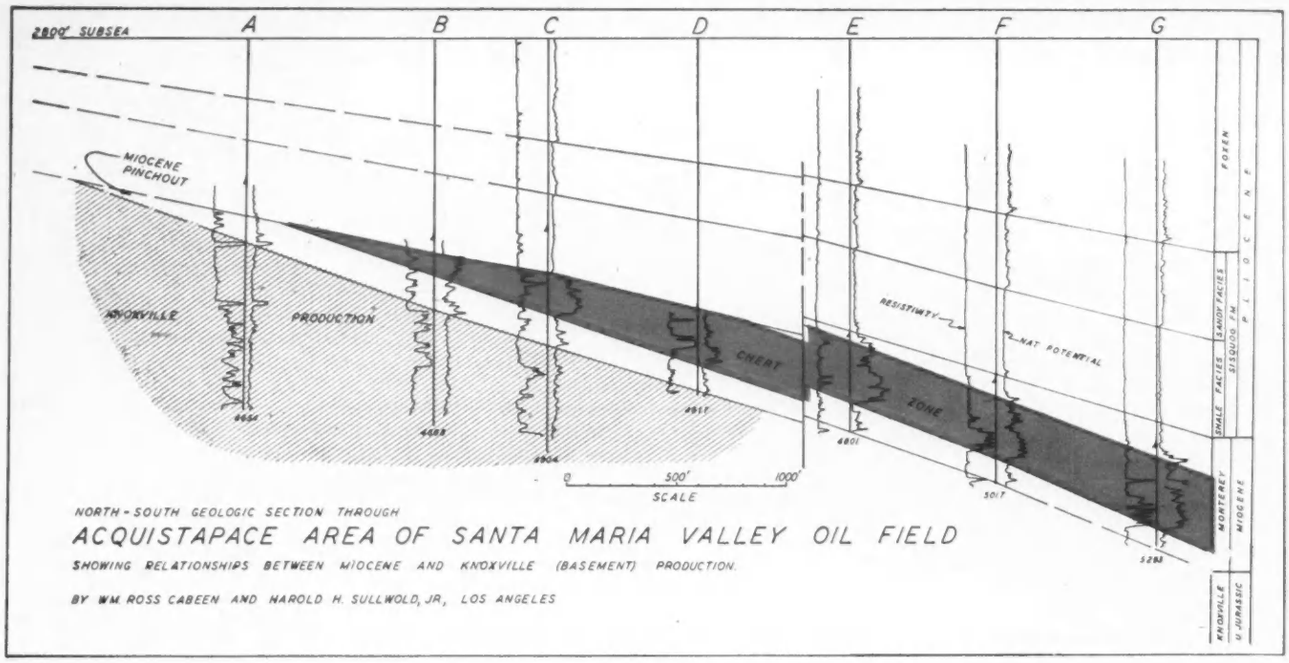

FIGURE 3

the "detrital" zone and a few feet at the top of the Knoxville had been open and subsequently wetted by water from the chert zone.

There are now about 420 acres proven in the Knoxville. Very little is known about the amount of oil in the reservoir, as unfortunately little if any P.V.T. data has been taken. Electric log correlations in the majority of cases are impossible with any degree of assurance. This is mainly because of variation in degree of fracture permeability both laterally and horizontally from well to well. It is believed that the hard sandstones contain more open fractures than do the shale intervals. Promising electric log curves have been taken in poor wells and vice versa. Favorable looking electric logs from poor wells are probably due to the fact that the abundant sections of fracture permeability recorded opposite the bore of the hole are very limited laterally. In the case of poor looking electric logs showing few spots of fracture permeability yet resulting in very good wells, the answer probably is that these very few spots connect laterally and vertically with large areas of fracture permeability. The little coring that has been done has not been very helpful either from a geological standpoint or as an indication of productivity. Oil has been noted on fractures in many wells that took one core on bottom, some as deep as 1200 feet into the Knoxville. However, in general, because of the fracture type of reservoir, very little and in some cases no signs of oil are found in coring. The top of the Knoxville in the central portion of the field is 1800 feet higher than the base of the producing Miocene interval in the farthest well directly down-dip. The type of oil in the two zones is very similar, with the Knoxville having an edge of a degree or two in gravity. Thus, one would suspect that the Miocene oil has merely migrated northward laterally into the fractures in the basement, and that this open communication would tend to produce a water table in the basement at about the same level as in the Miocene.

Opposed to this concept is the great difference in pressure between the two zones. However, this water table is very irregular due to local overproduction in the past and due to fault control. At any rate, a definite bottom water has not been established in the Knoxville. It appears that there is a very large volume of rock in which oil-bearing fractures could be present. The volume of oil in reserve however, can not be estimated, as there is no way of predicting degree of fracturing in undrilled locations. That the basement production can be definitely profitable is demonstrated by the fact that the payout on Gerard's wells averaged less than a year, and many of the Knoxville wells are still producing the field maximum allowable (200 barrels daily at the present time) after two years. It is quite likely that many more satisfactory basement wells will be drilled, particularly along the north border of the field at up-dip locations. In the classifications of Wilhelm this pool would fall into Bc-IV, fracture permeability trap in monoclinal environment.

Wilmington

The Wilmington field is ideally situated in the Los Angeles Harbor district. This tremendous reserve is trapped in a broad faulted, northwest plunging nose, presumably one end of a closed anticline, the other end of which lies beneath the ocean. Pliocene and Upper and Middle Miocene shales and sands overlie a schist basement of the same type as found in the El Segundo field 10 miles to the northwest. The upper zones range in depth from 2400 feet to 6800 feet and include an aggregate thickness of about 1500 feet of productive sands. The top of the schist is an erosion surface with considerable relief, and lower portions of the Miocene sedimentary series are missing over certain schist high areas. Daily production from the field is in excess of 100,000 barrels per day of 13° to 32° gravity oil, the largest production for any one field in the state.

Since establishment of commercial production in 1936, several wells have been drilled to the schist. But it was not until the early part of May, 1945, that production from the schist itself was established. At that time a large operator, who prefers to remain anonymous, took a well on Terminal Island near the top of the structure down into the schist 130 feet and made a production test of isolated basement. It flowed oil at 400-barrel per day rate for one day beaned back with pressures suggesting that it could do much better. Having thus established the schist as a potential producing zone, the operator plugged the well back and completed from an uppper zone, apparently preferring to defer development of the schist to a later date.

In the latter part of 1945 and early in 1946, Long Beach Oil Development Corporation, in the same area but a little farther down on the south flank, placed five wells on multiple-zone production with schist intervals open. Three of these wells ("W"-109, "W"-118, and "W"-121) demonstrated production rates of 1200 to 2000 barrels daily in formation tests with only schist open. They vary from 5997 feet to 6501 feet in depth with about 100 feet of schist penetration. "W"-121 made three tests, and the lowest one demonstrated the presence of bottom water below 6200 feet. Two other companies each have one well with schist open to production, but have not demonstrated that the schist was contributing to production. Several down-structure schist tests were wet at both the east and west ends of the field. It thus appears likely that the area of schist production will be limited as compared to the upper zones. The schist pool is tentatively classified as A/Bc-Ia, a convex trap reservoir modified by fracture permeability in an anticlinal environment.

The schist here is very hard, greenish-gray and locally talcose. Sometimes only two or three feet can be made with a bit. It is fractured, resulting in fragmentary core recovery. Cores show the oil to be in the fracture. In the present productive area the schist is

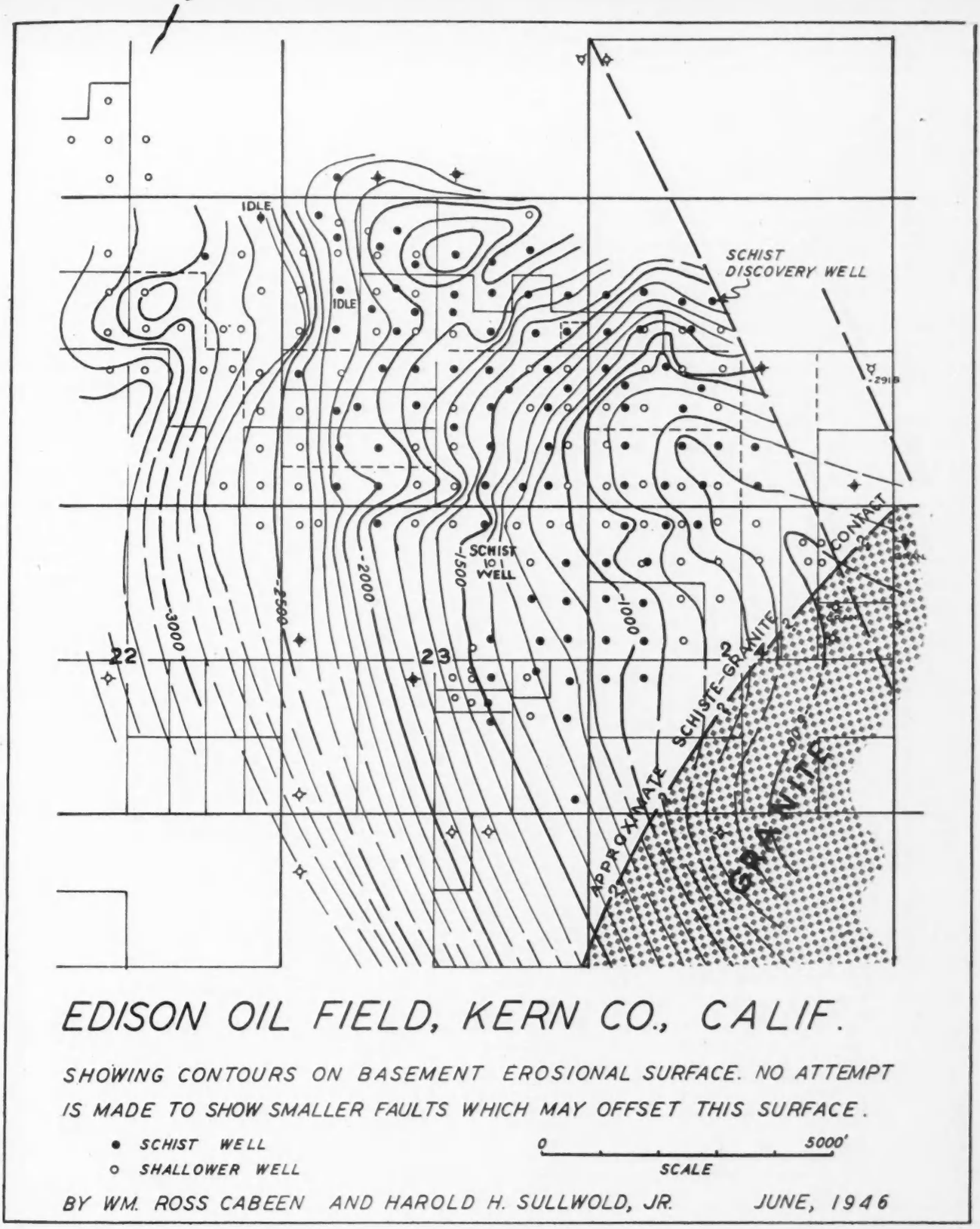

FIGURE 4

sealed by shale, but it is thought that in higher schist knobs the "Cederholm" or "237" zone may lie directly on the basement. A schist breccia, locally over 100 feet thick, overlies the schist. It varies from soft to extremely hard depending on the amount of weathering and the amount of cement.

At present the newly discovered prolific "237" zone, between the Ford zone and the schist, is the object of a very active drilling campaign. This zone is sometimes confused with true schist production. Development of the schist pool probably will be slow, since operators are not desirous of entering two simultaneous campaigns in the same area, and the land over the probable productive schist acreage is held for the most part in relatively large leases.

The pool has been insufficiently developed to permit of any estimates of reserves, but they will no doubt be substantial. The area explored to date is limited to that above the 6200-foot plane, and further may be limited within that area by local lack of fracturing.

The Edison oil field (Figure 4) is located on the east side of the San Joaquin Valley about nine miles southeast of Bakersfield, Kern County. The field

TABLE 1

Tabulation of Basement Data in California Fields in Which Basement has been Reached

(Field numbers correspond with those indicated on map shown as Figure 1)

NAME OF FIELD	Total Depth	Maximum Penetration	Lithology	Remarks
EAST SIDE SAN JOAQUIN VALLEY				
1. Mt. Poso area	3130′	127′	Schist and Granite	Several wells to basement.
2. Premier	7187	7	Decomposed diorite or Gabbro	No test.
3. Round Mtn.	1300-3760	203	Granite	No tests.
4. Kern River	5998	?	Granite	No test.
5. Fruitvale	10590	7	Igneous and metamorphic	No tests.
6. Ant Hill	4594	361	Schist	Tested wet.
7. Edison	1600-6026	1436	Schist and slate	Productive.
8. Mountain View	8419	8	Granite	No test.
9. Arvin	7722	17	Granite and schist	No test.
CENTRAL SAN JOAQUIN VALLEY				
10. Chowchilla	9062	17	Schist (Nevadan)	No tests.
11. Gill Ranch	9154	9	Diabase	No test.
12. Greeley	13469	4	Serpentine	No test.
WEST SIDE SAN JOAQUIN VALLEY[1]				
LOS ANGELES BASIN				
13. Los Angeles	2300′	962′	Fractured and weathered slate	No oil shows. (One test to 7505′ was in U. Miocene.)
14. Inglewood	12276	?	Probably schist	Basement data not released.
15. Playa Del Rey	7401(?)	500 ±	Schist	No production from schist alone. Prod. from schist conglomerate.
16. El Segundo	8009	300 ±	Schist	Productive.
17. Torrance	4835-6597	467	Green talcose schist	Tight or wet. Oil shows reported. No production tests.
18. Wilmington	6761	225	Schist	Productive above 6200′.
19. Dominguez	12720	Not released	Altered talcy schist	No oil shows.
20. Long Beach	14950	?	?	Basement may have been reached. Deep well on prod. from schist conglomerate.
21. Gardena	10594	79	Schist	New field (?). Test data not released.
VENTURA BASIN[2]				
SANTA MARIA BASIN AND NORTH COASTAL AREA				
22. Sargent	3053	520′ ±	Franciscan schist	No tests (?).
23. Santa Maria Valley	4385-5800	1200	Fractured Knoxville	Productive.
24. Zaca	6643	143 ±	Knoxville (?)	No test.

Summary: Basement reached in 24 fields and tested in only seven that authors know of. Of these seven, four are now producing.

[1] No wells to basement. Limited by depth due to thick Cretaceous section. [2] No wells to basement. Limited by thickness of Tertiary and Cretaceous section.

was discovered in 1931 and has produced from several different Pliocene and Miocene sands from 1000 feet to 40000 feet in depth, trapped by lenticularity, faulting, and buttressing against a basement schist "high."

California basement production assumed increasing importance in July, 1945, when Harry H. Magee completed his Brockman 3 for 528 barrels daily of 19.2° gravity oil with perforations from 2218 to 2301 feet, all in schist. This well, drilled on a six-hundred-acre block precipitated a very active drilling campaign which is still going on. Ninety producing schist wells were completed in the past 12 months, and they produce nearly 11,000 barrels per day with a maximum allowable per well of 194 barrels daily.

The discovery was partly an accident and partly the result of open-minded acceptance of facts without prejudice. Brockman 3 was drilled to test possible sedimentary buttress sands against the schist high. One night when the geologist was absent the well was carried about 100 feet into the schist. A schist core contained oil in the fractures, and after some discussion between the interested parties it was decided to run a formation tester. In testing, the packer slipped down the hole with the 60 feet stinger coming to rest on the bottom, and when the drilled pipe was pulled oil flowed half way up to the crown block.

The second schist well was Harry H. Magee-Independent Exploration Company's Daugherty 3 which was first completed as a 10,000 MCF gasser and subsequently deepened and produced 1440 barrels of 19.0° gravity, 0.1% cut and 1000 MCF through a 12/64-inch bean from 80 feet immediately below the gas zone. Many wells in the field have potentials in excess of 1000 barrels daily. Penetrations vary from less than 70 feet to 1436 feet with no apparent relationship between depth and productivity except that extremely deep penetration is apt to find bottom water.

Development has revealed the following facts: The basement rock is crystalline, mica-, chlorite-, and talc-schist, black slate, and altered volcanics with abundant fractures and pits locally coated with pyrite and calcite. Schistosity is very steep. The upper portion of the schist is soft, presumably weathered in places, and is barren of oil or water. The thickness of this zone is quite variable. The top of this weathered zone in many places is quite hard to pick as it is often overlain by the sedimentary non-marine Walker formation that contains abundant material derived from the schist. The main part of the schist is very hard drilling, averaging one to twenty feet per bit. Gravity of oil ranges from 12° to 23° API and does not depend on structural position or depth. There is no uniform water table. Satisfactory correlations below the top of the schist cannot be made on any basis so far attempted. Many of the early wells were completed barefoot, but 180 to 320 mesh slotted liner has become popular more recently.

Seven or eight miles to the east, schist is found as inliers in the acid granitic rocks of the Sierre Nevada batholith, and is therefore older than the Nevadan orogeny. The schist of the Edison field is assumed to be of the same age. If these schists may be correlated with the Mariposa slates farther to the north they are of Kimmerigdian age (still Upper Jurassic, but older than the Franciscan-Knoxville group of Tithonian age). The reservoir is, of course, the void space in the schist resulting from fracturing and pitting. The source is undoubtedly the marine Miocene formations which dip down to the west into the San Joaquin Basin and buttress up-dip against the schist. Fault contact with Pliocene non-marine oil sands may also have provided a a source. The trap or seal is vague. In some areas, especially the south end of the field, a weathered impermeable zone separates the productinve schist from the wet depleted sands above. In the northern part, shale lies on the schist. In some areas oil sand lies on the schist. Nowhere within the productive limits of the field does gray sand contact the fractured schist. In one area of about 40 acres the Santa Margarita (Upper Miocene) sand is faulted against the schist and contains oil and water of the same type as the schist. It is thought that in this area the Santa Margarita oil actually came from the schist. Elsewhere in the field the Santa Margarita is wet. Development has not yet determined the nature of the up-dip closure, but it is probably at the contact between schist and granite. This is indicated by the fact that several barren wells have cored granite in the eastern portion of the field near its apex.

Structurally the field may be classified as Bc x F-II, fracture permeability trap modified by faulting in a structural salient. However, Wilhelm's classification does not adequately cover schist reservoirs trapped by igneous intrusions.

The reserves of the schist pool have been estimated at an average of 20,000 barrels per acre or 20,000,000 barrels for the field thus far developed. Some estimates give the better wells 30,000 to 50,000 barrels per acre. This pool is probably the most significant addition to California reserves in recent years. The high productivity of these wells combined with shallow depth and proximity to pipe lines and reffineries makes them very profitable.

Resume

There are a number of characteristics which the basement pools discovered to date have in common.

1. They are all lower pools in already producing fields.

2. Porosity is due to fracturing and

solution cavities, not intergranular spaces as in sandstone.

3. The reservoir is apparently confined to brittle rock which can hold open fractures. Shale (slick black) as at Santa Maria, and soft weathered schist as at Edison are tight and barren.

4. There are fault connections between younger producing zones and basement.

5. The character of the oil is very similar or identical to that of the upper zones.

6. There is enough structural relief so that downward migration of oil is not required. Oil saturated sands or source beds occur adjacent to basement area and at lower evelvations.

7. Drilling in the basement is very hard and therefore slow and expensive.

8. Cores in many cases show little if any signs of oil.

9. Productivity from well to well is much more variable than in the case of sand reservoir wells.

10. Correlation within the basement from well to well by electrologs or on any other basis is usually difficult or impossible to make.

Many of the above characteristics may be regarded as criteria to be sought in determining areas to be prospected for basement production. First of all, the basement must contain open fractures or cavities, which, unfortunately, can be determined only after the well is drilled. Second, there must be a source from which the oil can migrate into the fractures. Third, there must be channels to permit this migration. We are assuming that the oil does not originate within the basement. Fourth, there must be some sort of trap. This is rather obscure in the basement fields now productive. In El Segundo and Wilmington the surface of the schist is convex. In Santa Maria Valley up-dip closure may be due to closing of fractures due to mineralization or separation of possible reservoir strata from the productive area by impermeable "slick black" shale. Edison development is still continuing up-dip, but may be terminated in that direction by contact of schist with granite, gradation into weathered schist, lessening of fracture permeability or some other cause.

It is significant to note that in only 24 of the 169 oil fields in California has the basement even been reached, much less tested. The accompanying table (Table 1) summarizes the data on these fields. In many areas basement drilling is limited by the extreme depths that would be required. For example, 23 out of 26 fields in the central San Joaquin Valley have been discouraged from basement drilling due to deep structural position. On the west side of the Valley none of the 23 fields have gone to basement because of the extremely thick unpromising Cretaceous shale and sand section that must be first penentrated. However, the lesser depths on the east side have resulted in nine out of 20 fields reaching the basement and one found it productive (Edison). Of these nine, however, only two tested it. The northern district, with three out of 18, is also confronted with the thick Cretaceous section. Basement has not yet been reached in the Ventura Basin with its 39 fields. The Los Angeles and Santa Maria Basins have been more successful with nine out of 33 and three out of 13 respectively. It may generally be assumed that in fields where the whole sedimentary series has not been penetrated the basement would be too deep to encourage testing it. These possibilities must be carefully weighed in the case of each field, however, as there are some fields in which the basement has not been reached and could, and others in which it has been reached but not thoroughly inspected or tested. Indeed, of the 24 fields in which basement has been reached, only in seven has it been tested to our knowledge, and, of these, four are productive! In some cases data have not been released, and there may have been some tests made of which we are not aware.

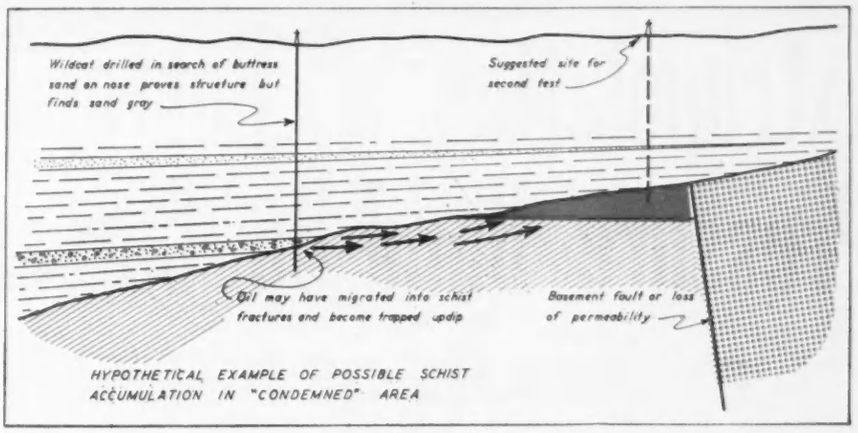
Wildcat drilled in search of buttress sand on nose proves structure but finds sand gray
Suggested site for second test
Oil may have migrated into schist fractures and become trapped updip
Basement fault or loss of permeability
HYPOTHETICAL EXAMPLE OF POSSIBLE SCHIST ACCUMULATION IN "CONDEMNED" AREA

FIGURE 5

The conclusion indicated from these figures is that the brittle fractured basement complex underlying the relatively more plastic sedimentary section in many California oil fields and wildcat areas is practically unexplored and offers abundant possibilities for future oil reserves.

The obvious place for future exploration is in or near old fields where conditions are similar to those already discussed. However, there are possibilities other than below present or future productive fields. For example, suppose a wildcat is located on a suspected nose in search of a sand buttressing against the basement. (See Figure 5.) The well is drilled and finds the structural picture as expected, but the sand is wet, and immediately below the wet sand the well bottoms in fractured schist which also is unproductive. This might happen nearly anywhere on the east side of the San Joaquin Valley. It is the author's proposal that the oil might have migrated out of the sand into the schist fractures and possibly been trapped higher up-dip by a fault within the schist, by a reversal of dip at the top of the schist, by lessening of fracture permeability, or by any one of several reasons. It is suggested that a second test might be justified as a pure gamble for schist production. This might be particularly attractive with certain additional information. Geophysical data might give a clue suggesting a buried hill, fault or change in lithology in the schist to aid in locating the second well. A study of structural patterns in the nearby basement outcrops and in nearby wells (if any) might serve a similar purpose. Sufficient core data from the first well to indicate an abundance of fractures would be desirable. Many other possibilities for schist accumulations will no doubt occur to the reader.

In general it may be said that the borders of the Los Angeles Basin, Santa Maria Basin, and East Side of the San Joaquin Basin offer the most hope for basement production within reasonable drilling depths. A wildcat schist basement test is now being drilled by Shell Oil Company on the western margin of the Los Angeles Basin between the Playa del Rey and El Segundo fields. At the present writing this well (Six Companies 1) looks like it may be a new basement discovery for California. A formation test on June 29, open 1¼ hours, with the interval 6862 feet to 6939 feet open, all below the top of the schist, recovered 3000 feet of heavy muddy oil and oil with 100 feet of oily mud on bottom. Operators are planning to set casing for a production test.

Looking Forward

The recent demonstrations of decidedly commercial production from a new type of reservoir in California, the basement complex, have stimulated much thought among forward-looking operators. The California basement scarcely has been touched. It is expected that a careful review of old fields and "condemned" areas will result in numerous basement tests where depths are not prohibitive Likewise wells in active Tertiary wildcat areas will take a more careful look at the basement than has been the case in the past. Many rank wildcats will be drilled with the basement as their sole objective. It is to be hoped that the four present productive fields are merely fore-runners of a series of discoveries that will add considerably to California's oil reserves.

ACKNOWLEDGMENTS

The geological literature of California, from which the authors have drawn, is too voluminous to permit proper credit in a paper of this scope, but four publications which were particularly helpful should be mentioned.

[1] "Geologic Formations and Economic Development of the Oil and Gas Fields of California," by many authors, Bull. 118, California Division of Mines, 1943.

[2] "Structural Evolution of Southern California," by R. D. Reed and J. S. Hollister, A.A.P.G., 1936.

[3] "Franciscan-Knoxville Problem," by N. L. Taliaferro, A.A.P.G. Bull., vol. 27, No. 2, 1943.

[4] "Prospects for Deeper Zone Production in California," by Albert Gregersen and Frank S. Parker, California Oil World, Sept., 1944.

Three of the four basement pools of California have not yet been described in the literature. For these and for data on various wells which cored basement rock the authors have made use of their own experience and consulted numerous local geologists to whom they are greatly indebted. More particularly these are Messrs. Harry Campbell and Jack Beach (Edison); Aden Hughes (Santa Maria Valley); Read Winterburn and Dudley Hughes (Wilmington); A. L. Hunter and J. H. Abrahamson (Torrance); L. E. Porter (El Segundo); S. G. Wissler, Wm. Thomas, A. O. Woodford, Frank S. Parker, Loyde H. Metzner, Vincent Van Diver, Glen Gariepy, Lou Rogers, Ashley Holston and Owns McCloskey. The authors are indebted also to Frank Carter who critically read the manuscript.

Extrapolation of Bottom-Hole Pressure Build-Up Curves

BY MEANS OF DIFFERENCE TABLES

By J. J. ARPS, Chief Engineer
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WHEN a producing well is shut in, the pressure in the well bore opposite the producing formation will generally begin to rise, rapidly at first, and gradually slower later on until finally a maximum is reached. This maximum is commonly called the static bottom-hole pressure and will be reached when the pressure in the well bore is in equilibrium with the pressure in the surrounding formation. Knowledge of this static bottom-hole pressure is essential in reservoir engineering work and it is also used to a great extent for reserve estimates and proration purposes.

Unless the productive index is relatively high, it is not always feasible or practical to shut a well in long enough to allow the pressure to reach equilibrium, and in such cases, the static bottom-hole pressure must be calculated or estimated from a series of pressure observations during the allotted shut-down time. It is obvious that, if this can be done in a simple and reliable way, the shutdown time may also be considerably shortened and appreciable savings made in downtime and lost production. The different means now available to obtain these bottom-hole pressure observations may be briefly listed as follows:

A. A self-recording bottom-hole pressure gauge or pressure bomb, which records bottom-hole pressures directly.
B. Fluid level observations taken with the bailer on a sand line or a float on a wire line; to be converted by means of the fluid gradient to bottom-hole pressures.
C. Indirect fluid level observations made by means of sound waves or possibly radio waves.
D. The "Copper Tubing Method"[1] which uses the pressure required to blow compressed air or gas through small diameter tubing lowered into the well along side the production tubing.
E. The top-hole pressure build-up in dry gas wells; pressures to be corrected for weight of gas column.

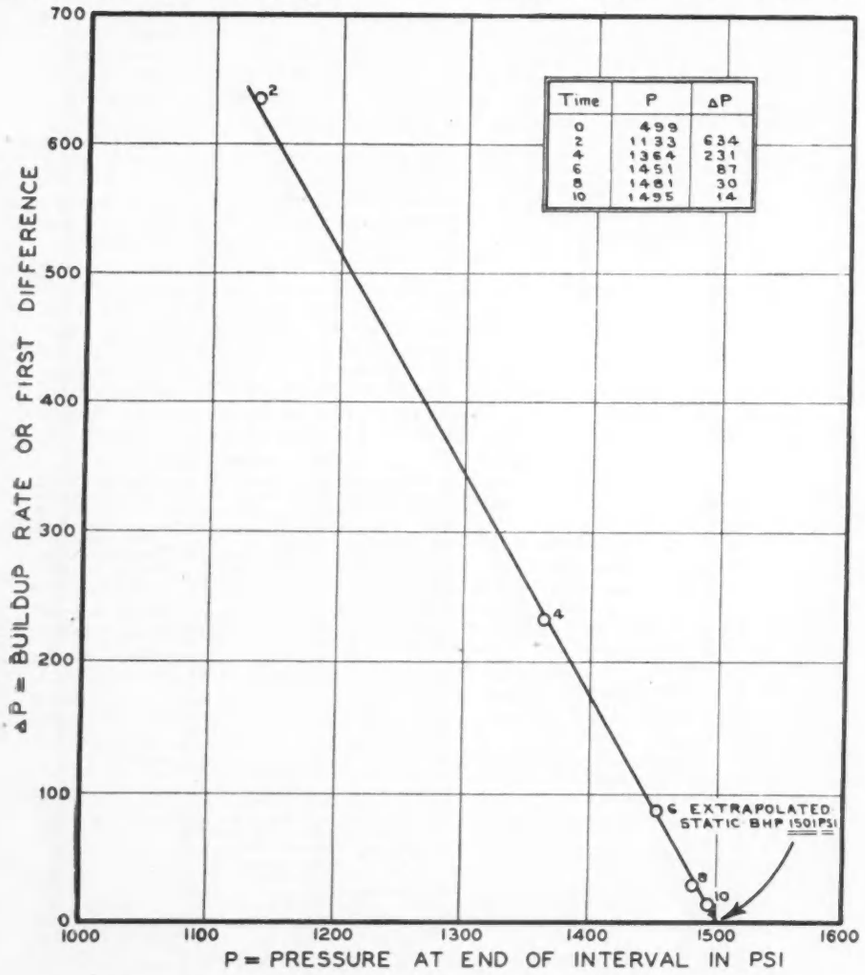

Figure 1. Graphical determination of static bottom-hole pressure (constant productive index).

The bottom-hole pressure observations made during the build-up period by means of any of the above methods can be utilized to arrive at the static bottom-hole pressure by various extrapolation methods, some of which are well known from earlier publications[2, 3] on this subject, and will therefore only be briefly reviewed in Section III. Others, such as the Difference Table Method, are not as widely known, and it is the main objective of this article to introduce the application of this method in the extrapolation of build-up data and the determination of the productive index.

To calculate or estimate the static bottom-hole pressure from a series of pressure observations is sometimes complicated by various abnormal conditions. A gradually changing productive index[4] may upset the fairly simple relationships which can be expected from normal Darcy-type flow into the well bore. The presence of different zones with unequal static pressure in the same well may be another reason why such simple relationships are not always directly applicable to actual well data. Aside from these disturbing factors and even in those cases where Darcy's law in its simplest form is applicable, the extrapolation of build-up data by conventional means remains usually a rather involved procedure, requiring graphical or numerical solution of exponential equations (see Section III).

The difference table method has the advantage of being comparatively simple and shows promise at the same time

that it can be used even in those cases where the productive index is not constant. As will be shown later in the mathematical analysis of build-up curves in Section II, it is very important when this difference table method is used that all pressure observations are made with exactly the same time intervals. A solution is still possible when these intervals are not constant, but it usually involves a great deal more work. Another point, which is sometimes overlooked, is the importance of producing all adjacent or offset wells at their normal rates so that a pressure representative of the active formation pressure around a given well can be obtained.

Difference Table Extrapolation Methods

A. Numerical Procedure

(1) Static Bottom-Hole Pressure

When it is only necessary to arrive at the final or static bottom-hole pressure from a series of build-up data, the simplest and most accurate procedure is the use of a horizontal difference table[5] as shown in Tables 1 and 2. The procedure itself consists of dividing the square of the build-up rate by the decrease in build-up rate and to add this ratio to the observed pressure. The result is the calculated static bottom-hole pressure. The mathematical background for this will be found in Section II (see Equation 3A). To accomplish this, three or more bottom-hole pressure readings are required, taken with constant time intervals. In the case represented by Table 1, six bottom-hole pressure observations were made in a well, two hours apart, which showed respectively 499, 1133, 1364, 1451, 1481, and 1495 pounds per square inch. It may be noted from these pressures that the build-up rate was slowing down, but the final static pressure was apparently not yet reached. The above pressure data are tabulated in the second column of Table 1.

In the third column is shown the first difference ΔP, which is the pressure increase or build-up rate during each preceding interval, while the fourth column represents the second difference Δ^2P or the decrease in build-up rate over each preceding interval. In the fifth column are listed the ratios of the square of the first difference ΔP and the second difference Δ^2P. Following the horizontal line, for instance, for the third observed pressure of 1364 pounds per square inch, it will be noted that the pressure increase over the preceding interval was 231, while the decrease in build-up rate Δ^2P over the same interval was 403 so that the ratio in the fifth column was calculated:

$$\frac{231 \times 231}{403} = 132.4 \text{ psi.}$$

This last number represents the number of pounds per square inch that the observed pressure was below the final static pressure, and therefore, by adding this amount to 1364, the approximate value of the static pressure was found at 1496.4 pounds per square inch in column 6. The same procedure is followed on the next line, resulting in a value of 1503.6 pounds per square inch. The average of the four values calculated from the six observations is 1501.0 ± 4.7 pounds per square inch. Since this mean error of 4.7 pounds per square inch is below the usual accuracy of pressure readings, the result can be considered satisfactory.

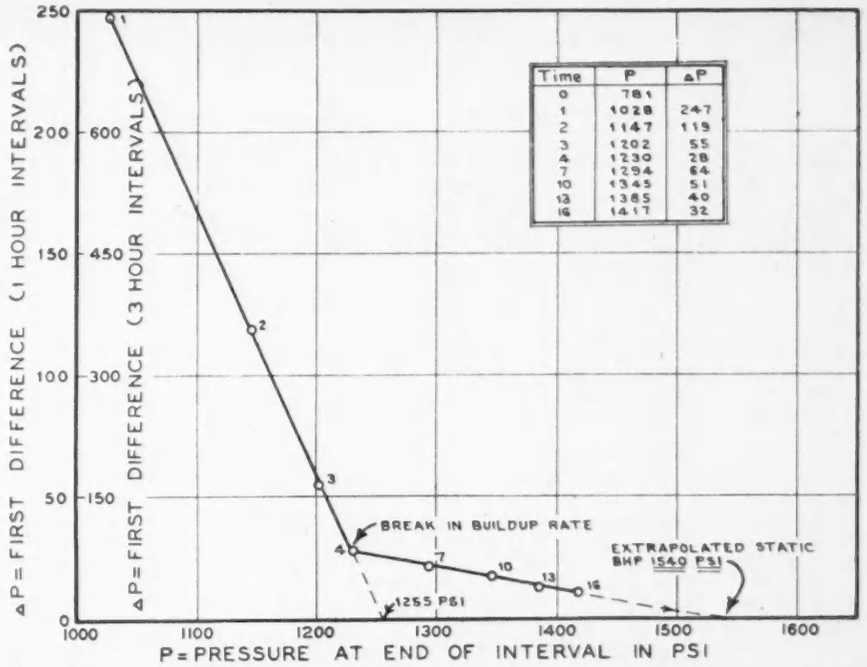
Time | P | ΔP
0 | 781 |
1 | 1028 | 247
2 | 1147 | 119
3 | 1202 | 55
4 | 1230 | 28
7 | 1294 | 64
10 | 1345 | 51
13 | 1385 | 40
16 | 1417 | 32
BREAK IN BUILDUP RATE
EXTRAPOLATED STATIC BHP 1540 PSI
1255 PSI
ΔP = FIRST DIFFERENCE (1 HOUR INTERVALS)
ΔP = FIRST DIFFERENCE (3 HOUR INTERVALS)
P = PRESSURE AT END OF INTERVAL IN PSI

Figure 2. Graphical determination of static bottom hole pressure (productive index not constant).

For the foregoing example, an actual case was selected, where, aside from some inaccuracies in reading the charts, the build-up apparently took place according to Darcy's law and where the productive index and the indicated static bottom-hole pressure were constant. The same method will now be illustrated with another case adopted from actual field records, where both the productive index and the indicated static bottom-hole pressure show a rather sudden change when the pressure reaches a certain point. (Table 2.)

This sudden break in the build-up relationship at 1230 pounds per square inch seems to be more or less characteristic for a group of wells in this same field. For those interested in some factual data regarding this pool, it may be mentioned that the initial bottom-hole pressure was 2082 pounds per square inch, the bubble point of the oil was 515 pounds per square inch, the gravity 27° API, the solution gas-oil ratio 77 cubic feet per barrel, and due to uneven penetration and withdrawals from two different zones in the same sand body during the early stages of the development, there was a difference in pressure between those two zones. Although still not fully explained it is quite possible that this break in the pressure build-up curve is connected with the unequalized pressure distribution in these two zones.

In cases such as that, it is sometimes necessary to deviate from the rule that all time intervals should be constant. The build-up rate in the final stage may be so slow that, unless a longer time

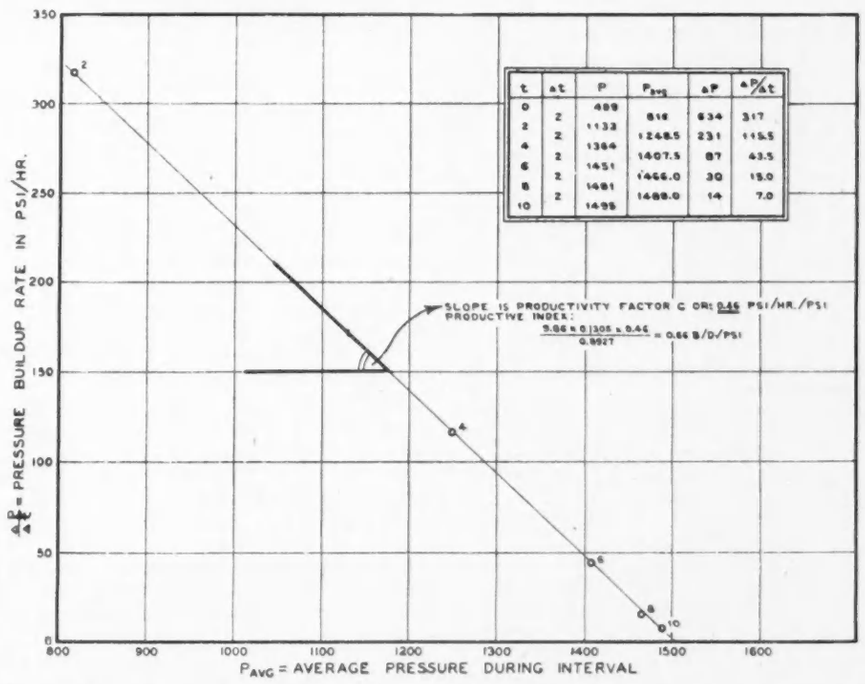
t | Δt | P | P_AVG | ΔP | ΔP/Δt
0 | | 499 | | | |
2 | 2 | 1133 | 816 | 634 | 317
4 | 2 | 1364 | 1248.5 | 231 | 115.5
6 | 2 | 1451 | 1407.5 | 87 | 43.5
8 | 2 | 1481 | 1466.0 | 30 | 15.0
10 | 2 | 1495 | 1488.0 | 14 | 7.0
SLOPE IS PRODUCTIVITY FACTOR C OR: 0.46 PSI/HR./PSI
PRODUCTIVE INDEX: 0.66 B/D/PSI
ΔP/Δt = PRESSURE BUILDUP RATE IN PSI/HR.
P_AVG = AVERAGE PRESSURE DURING INTERVAL

Figure 3. Graphical estimate of productivity factor and productive index (constant productive index.)

interval is chosen, the accuracy of reading the pressures is insufficient to follow the details of the build-up trend. In the example represented by the data on Table 2, the time interval was therefore increased after the fourth hourly reading to three hours. As a result of these unequal intervals, the calculations in columns 4, 5, and 6 on the horizontal line for 7 hours had to be left out. Otherwise the same procedure is followed as in the case of Table 1. The indicated or apparent static bottom-hole pressure during the first four hours was 1255.3 pounds per square inch with a mean error of 4.3 pounds per square inch. The indicated final static bottom-hole pressure during the last 12 hours was 1540.1 pounds per square inch with a mean error of 6.9 pounds per square inch.

(2) Productive Index

The same difference table method can also be utilized to determine the productive index from a series of build-up data provided the build-up test is made with open casing and only one liquid with known specific gravity is entering the well bore. The procedure is based on the fact that the second differential divided by the first differential is equal to the productivity factor. The mathematical basis for this method will be found in the derivation of Equation 2-A in Section II; the practical application is illustrated with the data in Table 3.

These data are from the same survey as used for Table 1. To obtain more accurate results, it is preferable to use for this purpose the somewhat more complicated diagonal difference table[5] in which the first differences are averaged in groups of two before combining them with the second differences. An important requirement is, as before, that time intervals in column 2 are constant; in this case they were two hours. Pressure observations are listed in column 3 and the first differences ΔP in column 4. In this diagonal table these first differences are posted in the middle of the interval covered. The average of successive first differences in column 5 is then again posted midway in between the differences of column 4 and on the same line as the second difference in column 6. The productivity factor C or the pressure build-up rate per hour per pounds per square inch differential, listed in column 7, is then simply the ratio of second and first difference, corrected for the length of the time interval in hours (Δt). To arrive at the productivity index I in column 8, it is only necessary to multiply the productivity factor C from column 7 with a constant factor, which depends on the cross sectional area of the pipe A in square feet and the specific gravity of the liquid. As an example, refer to the presssure of 1451 pounds per square inch after the sixth hour. The build-up rate at this time, according to column 5, was 58.5 pounds per square inch per two hours, while according to column 6 the build-up rate was decreasing by about 57 pounds per inch per (2 hours)^2. As a result, the productivity factor C is:

$$\frac{57}{2 \times 58.5} = 0.488$$ and the productive index I equal to:

$$9.86 \times 0.1305 \times 0.488 \div 0.8927 =$$
0.703 Bbls. per day per psi.

The average productive index found was 0.638 barrels per day per pound per square inch.

In Table 4 the same procedure is repeated with data from a well where the productive index seemed to change suddenly in value after the first 4 hours when the pressure reached 1230 pounds per square inch. The basic data are identical with those used in the static pressure calculation of Table 2. The results indicate that the productive index changed from an average of around 1.0 barrel per day per pound per square inch to a value of only 0.11 barrel per day per pounds per square inch after the fourth hour. It is well to point out that whereas the difference table method is 100 percent accurate as long as the time intervals are constant, the method described here for the productive index is only an approximation. The closer the pressure observations are spaced the more accurate the results. If a high degree of accuracy is required, it is better to determine static bottom-hole pressure with the difference table method and use Equation 9 in Section II to actually calculate the productive index.

B. Graphical Procedure

(1) Static Bottom-Hole Pressure

Instead of using a difference table directly for finding the static bottom-hole pressure (as in Section I-A-1) from a series of build-up data, it is sometimes more convenient to arrive at the same result by means of graphical procedure. In Figure 1 is shown how the data from Table 1 can be used to find the static bottom-hole pressure graphically. On the horizontal axis the pressure data from column 2 are plotted, while the vertical axis represents the first differences or ΔP's. It will be noted that the 5 points fall quite satisfactorily on a straight line, which intersects the horizontal axis at 1501 pounds per square inch pressure. That this should be a straight line is obvious from Equation 1 in Section II. The intersection with the horizontal axis represents the static bottom-hole pressure, since it can be easily seen that this is the pressure for a build-up rate ΔP equal to zero. If extreme accuracy is required, which usually is not the case in this type of work, the "least squares method" could be used for finding the most probable straight line through the given points and also the most probable static bottom-hole pressure. Without going into the derivation of the formula, it may be mentioned that this most probable static pressure, according to the method of least squares, can be found from the equation:

$$P_s = \frac{(\Delta P_1 + \Delta P_2 + \text{etc.}) \cdot (P_1^2 + P_2^2 + \text{etc.}) - (P_1 + P_2 + \text{etc.}) \cdot (P_1 \cdot \Delta P_1 + P_2 \cdot \Delta P_2 + \text{etc.})}{(P_1 + P_2 + \text{etc.}) \cdot (\Delta P_1 + \Delta P_2 + \text{etc.}) - n \times (P_1 \cdot \Delta P_1 + P_2 \cdot \Delta P_2 + \text{etc.})}$$

in which P_1, P_2, P_3, etc., represent pressure observations at the end of each interval while ΔP_1, ΔP_2, ΔP_3, etc., represent corresponding first differences and n the number of intervals. Substitution of the data from Table I gives us then:

$$P_1 + P_2 + \text{etc.} = 1133 + 1364 + 1451 + 1491 + 1495 = 6924$$
$$P_1 \cdot \Delta P_1 + P_2 \cdot \Delta P_2 + \text{etc.} = 1133 \times 634 + 1364 \times 231 + 1451 \times 87 + 1481 \times 30 + 1495 \times 14 = 1{,}225{,}003$$
$$\Delta P_1 + \Delta P_2 + \text{etc.} = 1495 - 499 = 996$$
$$P_1^2 + P_2^2 + \text{etc.} = 1133^2 + 1364^2 + 1451^2 + 1481^2 + 1495^2 = 9{,}677{,}972$$
$$\text{or } P_s = \frac{966 \times 9{,}677{,}972 - 6924 \times 1{,}225{,}003}{6924 \times 996 - 5 \times 1{,}225{,}003} = 1{,}500.53 \text{ psi.}$$

In Figure 2 it has been shown how the data from Table 2 can be handled in a graphical way and how the final static bottom-hole pressure can be determined as 1540 pounds per square inch. In order to take care of the change in intervals two different vertical scales had to be used. It will also be noted from this chart that at about 1230 pounds per square inch there is a sharp break in the build-up curve for this well. As mentioned before, no satisfactory explanation has been found for this unusual break other than that a possible unbalanced pressure condition exists between two different zones.

(2) Productive Index

The type of chart used in the preceding section for the static bottom-hole pressure is very simple since it is only necessary to plot the pressure increase during each interval against the pressure at the end of the interval and extrapolate the straight line obtained down to the horizontal axis. This method is entirely satisfactory and just as accurate as any other, as far as the static bottom-hole pressure is concerned. To determine the productive index by graphical means by calculating the slope of this line, however, is usually not accurate enough. To arrive at a more exact figure for the productive index, it is necessary to either plot the pressure increase per hour against the average pressure during the interval, or plot the average pressure increase during two successive intervals against the pressure. The first method usually gives results that are somewhat lower than the actual values, while results from the second method are generally on the high side. It is our experience that the first method is somewhat simpler to execute. If either one of

TABLE 1

Determinations of Static Bottom Hole Pressure by Means of Horizontal Difference Table (Indicated Static BHP Constant)

(1) TIME IN HOURS t	(2) Bottom Hole Pressure in Psi P	(3) First Difference ΔP	(4) Second Difference $\Delta^2 P$	(5) $\frac{(\Delta P)^2}{\Delta^2 P}$	(6) Indicated Static BHP $P - \frac{(\Delta P)^2}{\Delta^2 P}$
0	499	.....	.....	.....	.....
2	1133	+634	.....	.....	.....
4	1364	+231	—403	—132.4	1496.4
6	1451	+ 87	—144	— 52.6	1503.6
8	1481	+ 30	— 57	— 15.8	1496.8
10	1495	+ 14	— 16	— 12.2	1507.2
Average Indicated Static BHP (psi)					1501.0 ±4.7

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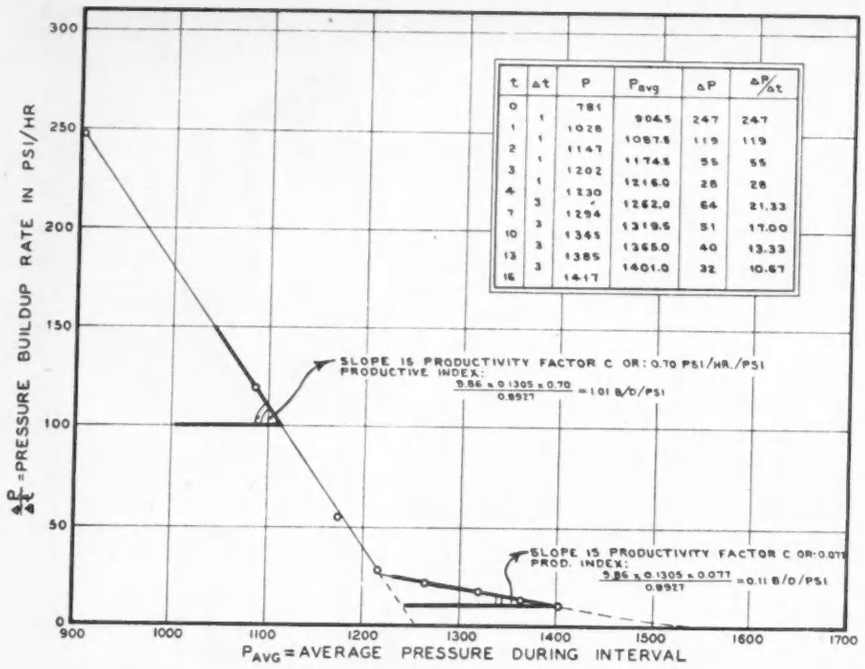

Figure 4. Graphical estimate of productivity factor and productive index (productive index not constant).

these methods is followed, the productivity factor C is represented by the slope of the straight line obtained (see Equation 1 in Section II), and the productive index I can be found by multiplying the productivity factor with a constant $\frac{9.86A}{g}$ as in Table 3.

In Figure 3 it is shown how the build-up data from Table 1 can be used to determine the productivity factor C and the productive index I, and in Figure 4 the same procedure is followed with the data from Table 2. On both charts the simpler method was followed whereby the pressure increase is plotted against the average pressure. As stated before, the determination of productive index by this method is only approximate, and for maximum accuracy, Equation 9 in Section II should be used.

Although a formula for the productive index could be given, based on the method of "least squares," it is felt that the accuracy of the manner in which the first differential is determined does not justify such a refinement.

II. Mathematical Analysis

In order to show how some of the methods, presented in the preceding section, were arrived at, the derivations of the basic equations will be briefly discussed in this section. For those who are only interested in the practical applications and who wish to skip the mathematics in this section, Section III will still be of interest since it presents a brief review of other extrapolation methods and formulas previously published.

Based on Darcy's law, the rate of influx into the well bore (or its equivalent in pressure build-up per unit of time) will be proportional to the differential between the static bottom-hole pressure P_s and the producing bottom-hole pressure P, or:

$$\frac{dP}{dt} = C(P_s - P) \qquad (1)$$

in which C represents the productivity factor or the pressure build-up in psi per hour per psi differential between P_s and P. Differentiation of Equation 1 leads to:

$$C = -\frac{d^2P/dt^2}{dP/dt} \qquad (2)$$

Or after substituting the difference symbol for the differential quotients:

$$C = -\frac{\Delta^2 P}{\Delta P} \qquad (2A)$$

which is the basis for the method followed in Section I-A-2 to determine the productivity factor by means of difference tables.

Elimination of C by combination of Equations 1 and 2 leads to the following expression for P_s:

$$P_s = P + \frac{(dP/dt)^2}{(-d^2P/dt^2)} \qquad (3)$$

Or after substituting the difference symbols for the differential quotients:

$$P_s = P + \frac{(\Delta P)^2}{(-\Delta^2 P)} \qquad (3A)$$

This is the basic equation for the method followed in Section I-A-1 for the determination of static bottom-hole pressure by means of difference tables.

The change over from differential quotients to difference symbols does not affect the accuracy of the equation as long as time intervals are constant. This can be easily shown by assuming that pressure observations P_o, P_1 and P_2 were made after o, t and 2t hours. The first difference over the second interval is then $\Delta P = P_2 - P_1$, while the second difference is $\Delta^2 P = P_o + P_2 - 2P_1$. After substitution of these values in Equation 3A, the same expression as in equation 17 is obtained, thereby proving that the difference table procedure is exact. Differential equation 1 can be converted to the following form for integration:

$$\frac{dP}{(P_s - P)} = Cdt \qquad (4)$$

After integration and elimination of the integration constant by setting $P = P_o$ for $t = o$, it is found that:

$$\log_e (P_s - P) = \log_e (P_s - P_o) - Ct \qquad (5)$$

from which the value for C can be calculated as:

$$C = \frac{1}{t} \log_e \frac{(P_s - P_o)}{(P_s - P)} \qquad (6)$$

From Equation 5 the general pressure build-up relationship can be found as:

$$(P_s - P) = (P_s - P_o).e^{-ct} \qquad (7)$$

The relationship between the productivity factor C, the productive index I, the cross sectional area of the pipe A in square feet, and the specific gravity of the liquid entering the well bore g can be easily calculated as:

$$I = \frac{9.86\,AC}{g} \text{ Bbls. per day per psi} \qquad (8)$$

This formula was used to calculate the productive index from the productivity factor C in Section I-A-2. To determine the productive index from the pressure data directly, Equations 6 and 8 can be combined:

$$1 = \frac{9.86A}{gt} \log_e \frac{(P_s - P_o)}{(P_s - P)} \qquad (9)$$

The bottom-hole capacity or drawdown potential D can be found as per definition:

$$D = I.P_s = \frac{9.86AP_s}{} \log_e \frac{(P_s - P_o)}{(P_s - P)} \qquad (10)$$

III. Other Extrapolation Methods

A. Numerical Method of Extrapolation

This method uses a direct algebraical solution of the basic equations and usually requires a time consuming process of solving a set of simultaneous exponential equations. Since such equations can not be solved directly except in the special case where the time intervals are constant, it results in a trial and error procedure that must be continued until the necessary accuracy is reached. As an example, we take the build-up data on a well where a survey

TABLE 2

Determination of Static Bottom Hole Pressure by Means of Horizontal Difference Table (Indicated Static BHP Not Constant)

(1) TIME IN HOURS t	(2) Bottom Hole Pressure in PSI P	(3) First Difference ΔP	(4) Second Difference Δ²P	(5) (ΔP)²/Δ²P	(6) Indicated Static BHP P—(ΔP)²/Δ²P
0	781	.....	.....	.....	.....
1	1028	+247	.....	.....	.....
2	1147	+119	—128	—110.6	1257.6
3	1202	+ 55	— 64	— 47.3	1249.3
4	1230	+ 28	— 27	— 29.0	1259.0
7	1294	+ 64	Unequal Intervals		
10	1345	+ 51	— 13	—200.1	1545.0
13	1385	+ 40	— 11	—145.4	1530.4
16	1417	+ 32	— 8	—128.0	1545.0

Indicated Average Static BHP (First 4 Hours) 1255.3 ±4.3 psi
Indicated Average Static BHP (Last 12 Hours) 1540.1 ±6.9 psi.

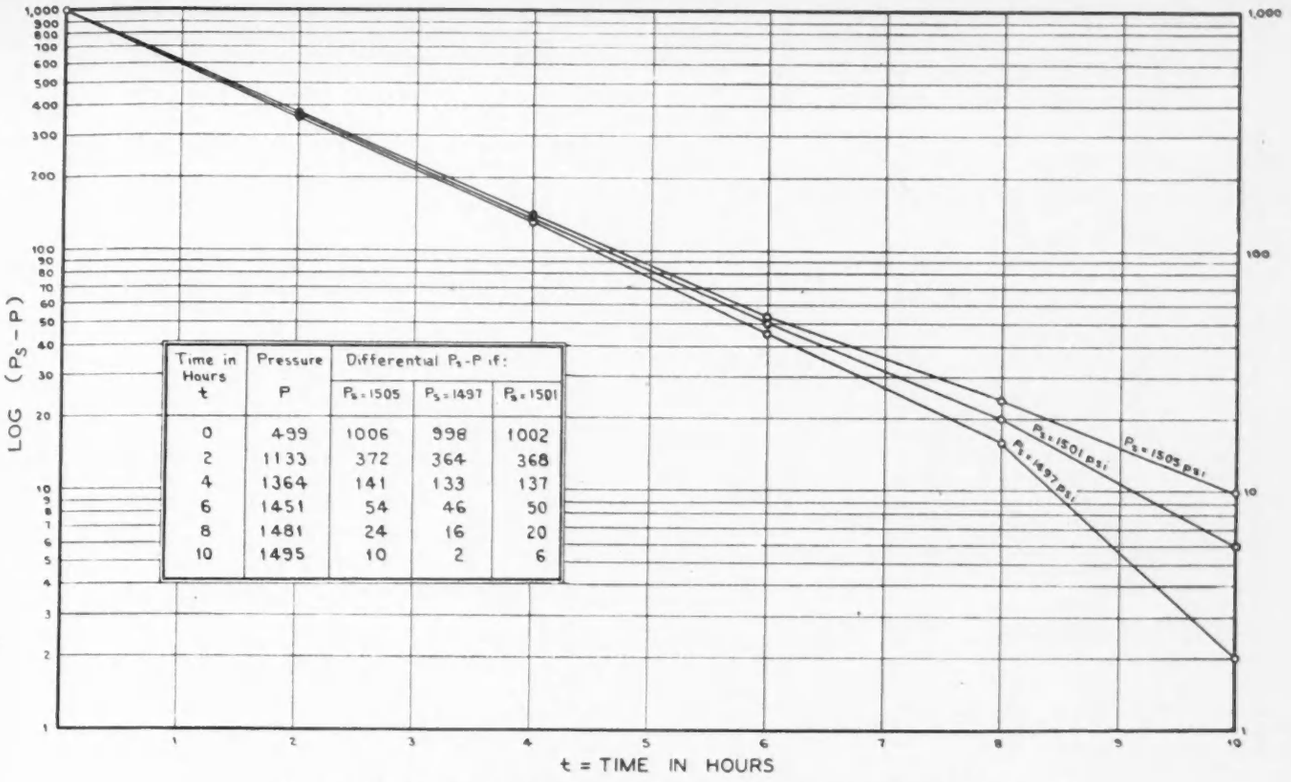

Figure 5. Semi-log graphical method of finding static bottom hole pressure P_s.

was made after the fluid level was bailed down:

Time in Hours t	Bottom Hole Pressure P in PSI
0 (=t_o)	278 (=P_o)
3	749
44	1500

The basic relationship to be used in this calculation is Equation 7 in Section II. If the first pressure point represents P_o for time $t = 0$, then there are two unknowns left (P_s and C), and for a complete solution two more points will be needed besides P_o. This makes it necessary to have a minimum of three pressure observations, as in the above example, for a complete calculation. By substituting these values in Equation 7, it is found:

$$(P_s - 749) = (P_s - 278).e^{-3C} \quad (11)$$

and:

$$(P_s - 1500) = (P_s - 278).e^{-44C} \quad (12)$$

Elimination of C by substitution leaves one equation with one unknown:

$$(P_s - 1500)^3 . (P_s - 278)^{41} - (P_s - 749)^{44} = 0 \quad (13)$$

from which the static pressure P_s can be found by substituting different values for P_s into this equation until a value is found that will satisfy the relationship. By doing this it was found that such was the case with P_s being 1501 pounds per square inch. In other words, this calculation indicates that for all practical purposes the well had already reached static pressure after 44 hours of shutdown time. This well was well equipped with 5½-inch, 17-pound casing (cross sectional area A = 0.1305 square feet) and the oil entering the hole was of 25.7° gravity (specific gravity g = 0.90). From this data the productive index was calculated by means of Equation 9 as:

$$I = \frac{9.86 \times 0.1305}{0.90 \times 3} \log_e \frac{1501 - 278}{1501 - 749}$$

= 0.232 bbls. per day per psi and the bottom-hole capacity or drawdown potential D as:

$$D = 0.232 \times 1501 = 348 \text{ bbls. per day.}$$

When time intervals between points are equal, however, the calculation can be simplified considerably and the answer found directly from each set of three pressure data. No trial and error procedure is necessary as in the foregoing example. This can be shown by assuming three pressure points P_o, P_1, and P_2 at respective shut-in times of o, t and 2t hours. According to Equation 7 the two equations are then:

$$(P_s - P_1) = (P_s - P_o).e^{-Ct} \quad (14)$$

$$(P_s - P_2) = (P_s - P_o).e^{-2Ct} \quad (15)$$

which, by elimination of e^{-Ct} can be simplified to:

$$\frac{P_s - P_2}{P_s - P_o} = \frac{(P_s - P_1)^2}{(P_s - P_o)^2} \quad (16)$$

From which P_s can be solved directly as (Lit. 3):

$$P_s = \frac{P_1^2 - P_o . P_2}{2P_1 - P_o - P_2} \quad (17)$$

The use of this formula will be illustrated with the build-up data from another well where pressures were taken at equal time intervals.

Time in Hours t	Bottom Hole Pressure P in PSI
0 (=t_o)	$P_o = 1649$
3	$P_1 = 1928$
6	$P_2 = 2116$

By substitution of these data in Equation 17, we find for the static pressure P_s:

$$P_s = \frac{1928^2 - 1649 \times 2116}{2 \times 1928 - 1649 - 2116} = \mathbf{2504.1 \text{ psi.}}$$

and for the productive index 1 (5½-inch, 17-pound casing with 0.1305 square

TABLE 3

Determination of Productive Index by Means of Diagonal Difference Table (Production Index Constant)

(1) TIME in HOURS t	(2) Time Interval in Hours Δt	(3) P.H.P. Pressure in psi P	(4) First Difference ΔP	(5) Average First Difference ΔP_{Avg}	(6) Second Difference $\Delta^2 P$	(7) Productivity Factor C $\frac{-\Delta^2 P}{\Delta P_{Avg} \times \Delta t}$	Productive Index I $\frac{AC}{9.86\ g}$
0		499					
	2		+634				
2		1133		+432.5	−403	0.465	0.670
	2		+231				
4		1364		+159.0	−144	0.453	0.653
	2		+ 87				
6		1451		+ 58.5	− 57	0.488	0.703
	2		+ 30				
8		1481		+ 22.0	− 16	0.364	0.525
	2		+ 14				
10		1495					
Average Productive Index (Bbls. per day per psi)							0.638

C = Productivity factor or the pressure build-up rate in psi per hour per psi pressure differential.
I = Productive index or the productive capacity in barrels of fluid per day per psi differential.
A = Cross sectional area of pipe in square feet (here for 17#, 5½" casing—0.1305).
g = Specific gravity of fluid entering the well (here for 27° API—0.8927).

TABLE 4

Determination of Productive Index by Means of Diagonal Difference Table (Productive Index Not Constant)

(1) TIME in HOURS t	(2) Time Interval in Hours Δt	(3) B.H.P. Pressure in psi P	(4) First Difference ΔP	(5) Average First Difference P_{Avg}	(6) Second Difference $\Delta^2 P$	(7) Productivity Factor C $\frac{-\Delta^2 P}{\Delta P_{Avg} \times \Delta t}$	(8) Productive Index I $\frac{AC}{9.86\ g}$
0		781					
	1		+247				
1		1028		+183	—128	0.700	1.009
	1		+119				
2		1147		+ 87	— 64	0.736	1.060
	1		+ 55				
3		1202		+ 41.5	— 27	0.651	0.938
	1		+ 28				
4		1230		Unequal Intervals			
	3		+ 64				
7		1294		+ 57.5	— 13	0.075	0.108
	3		+ 51				
10		1345		+ 45.5	— 11	0.081	0.117
	3		+ 40				
13		1385		+ 36.0	— 8	0.074	0.107
	3		+ 32				
16		1417					

A = Cross section area of 17#, 5½" casing—0.1305 square feet.
g = Specific gravity of 27° API fluid—0.8927.
Average productive index (first 4 hours) 1.00 barrels per day per pounds per square inch.
Average productive index (last 12 hours) 0.11 barrels per day per pounds per square inch.

feet inside cross section and oil of 0.90 specific gravity):

$$I = \frac{9.86 \times 0.1305}{0.90 \times 3} \log_e \frac{2504.1 - 1649}{2504.1 - 1928}$$

$= 0.88$ Bbls. per day per psi and the bottom-hole potential D as:

$D = 0.188 \times 2504.1 = \underline{471}$ bbls. per day

If more than the minimum of three pressure points is available for the above calculation, it may be necessary to carry out the calculation separately for each group of three. Four pressure points, for instance, will theoretically supply four independent solutions; five pressure points, ten solution, etc. If more than four points are available, however, it is usually much simpler to follow one of the graphical methods, discussed in Section I-B or III-B.

B. Semi-Log Graphical Method of Extrapolation

From Equation 5 it can be easily seen that there must be a linear relationship between the logarithm of the pressure differential $(P_s - P)$ if plotted against time t. This is the basis for a graphical approximation method which was first proposed by Muskat[2] and which follows the following procedure:

1. Assume a value for P_s and determine $P_s - P$ for each of the pressure observations.
2. Plot the values for $(P_s - P)$ obtained against time t on semi-log paper.
3. If the points fall on a straight line, the correct value for P_s was selected.
4. If the points do not fall on a straight line but seem to curve downward, the value chosen for P_s was too low and a higher value should be tried out.
5. If the points seem to curve upward, the selected P_s value was too high and a lower one should be chosen.

Two or three trials are usually necessary to find a reasonably accurate value for P_s. As an example, the data from Table 1 were used in Figure 5 and the pressure differential plotted on semi-log paper for an assumed value for P_s of 1505 pounds per square inch. The right-hand side of the curve appears to be turning upward. The next selection was 1497 pounds per square inch, which made the curve turn the other way. As a third selection, P_s was made equal to 1501 pounds per square inch which resulted in a reasonably straight line, indicating that the correct value was found.

The advantage of this method is that it works just as well for unequal time intervals as for equal intervals. Its disadvantage is that it will only work if there is straight Darcy type flow into the well bore so that the productive index is constant. If the index changes suddenly, as in the example of Tables 2 and 4 and Figures 2 and 4, or gradually,[4] then the method loses its value.

VI. Other Applications: Law of Diminishing Returns

The build-up relationship expressed by Equation 7 has a much larger field of application than is generally realized, and the extrapolation methods discussed in this article can very well be applied to these other applications.

Any reaction or process whereby a certain variable is increasing towards a saturation point and whereby the rate of increase is proportional to the amount of "under saturation" will show similar characteristics as the bottom hole pressure build-up relationship, and will result in what is commonly called the "Law of Diminishing Returns." For instance, when a condenser is being charged the current input is proportional to the voltage differential between the condenser and the source of the current. Since the condenser is gradually reaching the final voltage the current will diminish just like the build-up rate in an oil well. When a chemical reaction takes place and the reaction products which are formed are not removed, they may retard the reaction itself and a similar relationship as the build-up curve will result. The same thing applies in the field of physics to problems like the solution of salt in water, etc.

Another example is the increase in sales from an increasing number of sales outlets in a given territory. In such a case there is also a saturation point represented by the total market demand for the given area. In the field of petroleum engineering there is the problem of well spacing. In the so-called "Haseman-relationship" between ultimate recovery and number of wells on a given tract of land, it is assumed that the increase in recovery from an additional well is proportional to the difference between the total recoverable oil in place under the tract and the oil which will be recovered through the wells existing before the additional well is drilled. Although there is considerable controversy about the validity of this assumption, if it were correct, the same mathematical relationship would result as in all the other cases.

The above examples are picked at random and represent just a few of the many applications of the Law of Diminishing Returns. In each case, one may wish to determine from three or more observations of the build-up rate what the extrapolated part of the curve looks like and what the possible maximum value or the saturation point is going to be. In problems of that type the equations and methods given in this article can be applied just as well as for the determination of the static bottom-hole pressures. Once the relationship is determined from the date at hand, it is not very difficult to also determine the point where the diminishing return from the increased effort will cease to pay for itself. This may lead to a mathematical solution of the well spacing problem or the optimum number of sales outlets, if such were the problem.

List of Symbols Used

- P_s—Static bottom-hole pressure in psi ga.
- P—Bottom-hole pressure at time t psi ga.
- P_1, P_2, P_3—Successive pressure observations at the end of each interval.
- P_o—Initial bottom-hole pressure at time $t = o$.
- t—Time elapsed since first pressure measurement in hours.
- C—Productivity factor or pressure build-up rate in psi per hour per psi differential.
- I—Productive index in barrels per day per psi differential.
- e—Base of natural logarithms.
- Log_e—Natural logarithm.
- A—Cross sectional area of pipe in square feet.
- g—Specific gravity of liquid (water = 1.0).
- D—Drawdown potential or bottom-hole capacity in barrels per day.
- ΔP—First difference of pressure build-up curve or pressure increase during interval.
- $\Delta^2 P$—Second difference of pressure build-up curve or decrease in build-up rate.
- Δt—Length of time interval in hours.
- ΔP_{avg}—Average of two successive first differences.
- n—Number of equal time intervals.

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Anadarko Basin Prospects

By R. C. TUTTLE, Consulting Geologist

IN CERTAIN quarters there is some uneasiness concerning the future supply of petroleum in the United States, based on heavy withdrawals from reserves occasioned by the war as well as an expanding demand for crude and by-products. It cannot be denied that discovery of new and important oil reserves has lagged in this country when compared with the rate of new discoveries ten years or so ago. Although there is some justification for this pessimistic attitude when viewed in the light of certain unfavorable factors such as, for instance, a decline in drilling operations which could result from one or a combination of several economic causes, the fear that we are "running out of oil" certainly can have no foundation when viewed strictly from a geological standpoint and after due consideration has been given to the existing virgin regions where sedimentation and source beds provide suitable conditions for exploratory drilling. John A. Brown, late president of Socony-Vacuum Oil Company, in an address before The Economic Club of New York in 1944, graphically expressed this point when he declared that all the crude produced in the United States to date plus the proved reserves (estimated at approximately 20 billion barrels) would occupy only about two cubic miles of space, whereas at least 2,100,000 cubic miles of sedimentary strata exist in which to discover oil.

Included in such large areas of excellent potentialities is the Anadarko Basin which has been virtually unexplored. In a broad or regional sense the Anadarko Basin includes the Dodge City Basin and covers parts of four states embracing an area of some 140,000 square miles. It may be said to extend from the Sierra Grande Uplift of Colorado on the west, to the Barton Arch of Kansas on the north, and east to the Nemaha-Oklahoma City Ridge of Kansas and Oklahoma. The south boundary of the Basin is the Amarillo-Wichita Mountain Uplift of Texas and Oklahoma (Figure 1).

This vast area offers many promising reservoir beds as evidenced by the few deep wells drilled within its limits but this article is more particularly concerned with only that part of the Basin within the confines of the state lines of Oklahoma.

Very few wells have been drilled to a sufficient depth to test the Ordovician rocks, which will require depths in excess of 10,000 feet in the greater part of the basin, but deep drilling is the answer to enormous reservoirs in the West Texas Basin, Gulf Coast and California. The recoverable oil in the Anadarko Basin is estimated by some to be between 5 and 10 billion barrels, which is more oil than Oklahoma has produced up to the present time. Most oil companies have already accepted deep drilling for Oklahoma. For the small operator or those lacking the financial stamina for deep tests, there are many excellent areas from the "grass roots" to 6000 feet in depth on the north flank of the Wichita Mountains.

Achieving the goal of vast deposits of petroleum at depths of two or three miles has involved many problems in engineering and technology, but solutions to most of them are finally emerging from actual experience in the West Texas Basin, an area similar to the Anadarko Basin. In geophysical prospecting the Anadarko Basin is also similar to the West Texas Basin in that thick beds of evaporites are present in both areas, making recording and interpretation exceedingly difficult. As the instruments become more refined and the technique gathered from experience in West Texas is applied to the Anadarko Basin, more and more likely structures will be found.

The zones that have produced oil or have been reported to have shows of oil or gas will be cited subsequently, but listing from Permian downward the possible reservoir beds include the Clearfork, the Wichita Albany (Panhandle Big Lime), Pontotoc (Granite Wash) of Permian Age; the Deese, Hoxbar, Dornick Hills, Springer, Strawn; Tonkawa Sand, Layton sand, Cleveland sand, Cherokee Formation of Pennsylvanian Age; the Chester and Lower Mississippian, Misener, Hunton (Bois d'Arc-Chimney Hill), Viola, Simpson Group and the Arbuckle. So many possible zones under tremendous pressue is the basis for the high recovery estimates mentioned before.

It is not known at present just how marked the major unconformities of the Mid-Continent are in the Anadarko Basin but it is likely that some deep-seated structures within the Basin will be much shallower than anticipated due to erosion or nondeposition of overlying sediments because of orogeny and truncation marked by the unconformities.

A thick Mississippi Lime section will be encountered over the greater part of the Basin (Figures 2 and 3) and below the Mississippi Limestone, the Hunton Limestone, which includes the Bois d'Arc and Chimney Hill members also covers most of the Basin (Figure 4). Along the north edge of the Wichita

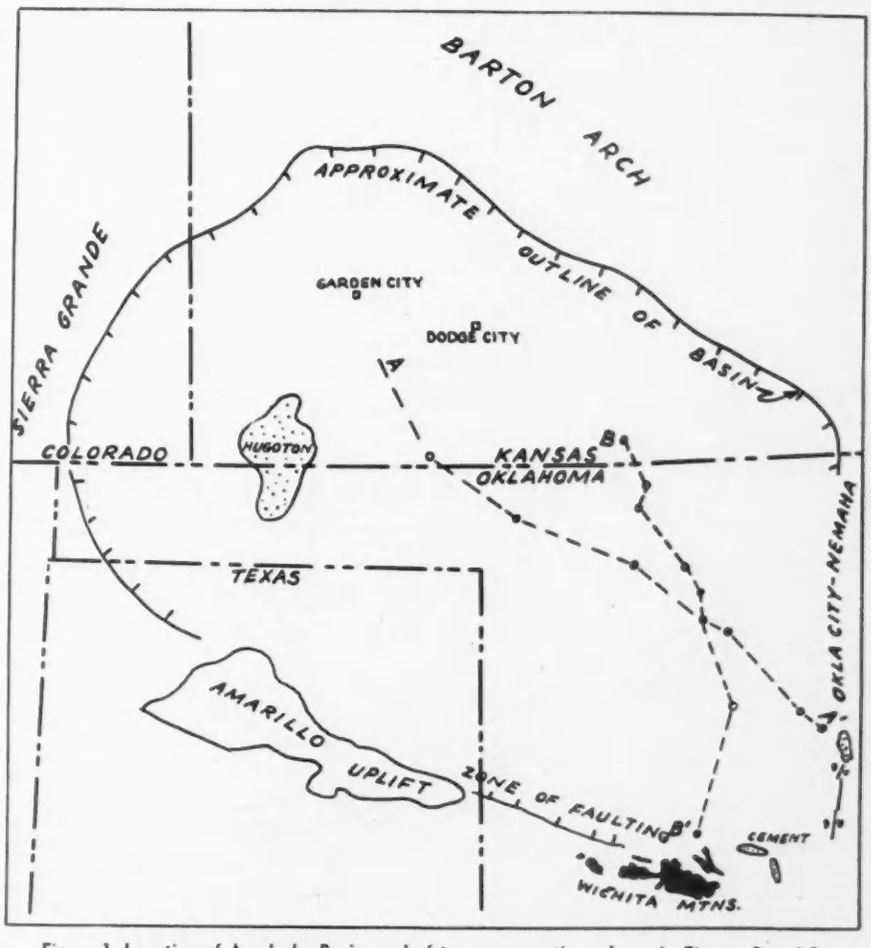


Figure 1. Location of Anadarko Basin, and of two cross sections shown in Figures 2 and 3.

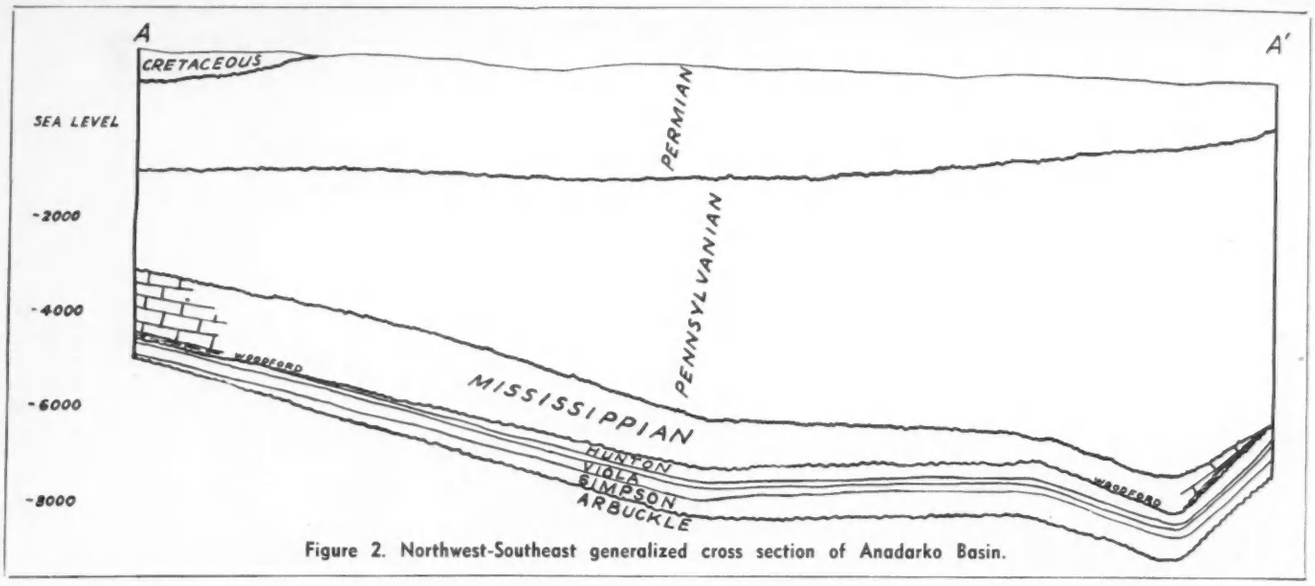


Figure 2. Northwest-Southeast generalized cross section of Anadarko Basin.

Mountains there is a relatively broad zone of complex block faulting where a test might encounter any formation from Pennsylvanian to Gabbro or Granite under the Permian at depths less than 6000 feet. The Cement, Apache and Gotebo pools are some of the fields in this zone of sharp folding and faulting. Sinclair Prairie Oil Company's German 1, in 1-6n-13w, was drilled in a down-dropped block to 11,026 feet in the Arbuckle Limestone. This test is evidence of the numerous formations present in the area, and any one of them could afford accumulation in one or more different types of traps along this faulted mountain front.

On the southeastern flank of the Basin several wells drilled by The Carter Oil Company in 6n and 7n-3w, and the Cities Service Oil Company well in 5n-4w, show the presence of several beds that could be productive zones in the proper structural position farther out in the Basin. The unconformity sand (Bartlesville) producing in the South Moore pool in 10n-3w could be present along the north-south line of faulting through ranges 2w and 3w (Figure 5). It is this line of faulting that delimits the Anadarko Basin to the east, south of Oklahoma City. Britton pool in 11n-4w and West Edmond located on the east flank of the Basin have production from several zones that can also produce farther west in the Basin. The Ordovician test in Blaine County drilled by The Superior Oil Company in 17-19n-10w shows staining in the Tonkawa and Layton sands and produces from the Chester (upper Mississippian age). Sinclair's Howell 1, in 26n-24w, Harper County, has produced gas and distillate for several years from a sand in the middle Pennsylvanian that correlates with the Cleveland sand of the eastern part of the Basin. The Oklahoma Natural Gas Company test in 17n-14w, Dewey County, had a show in the Layton and possibly can make a producer from the Cleveland sand.

The Pure Oil Company wells in the Oklahoma Panhandle produce from an Arkosic conglomerate of Pennsylvanian age. Stanolind Oil & Gas Company wells just over the Oklahoma state line in Meade County, Kansas, produce from Misissippian. The Hugoton Gas Pool of Stevens and Seward counties, Kansas, and Texas County, Oklahoma, produce from Permian Dolomite. The Sayre Gas Pool in Beckham County produces from Arkosic Dolomite and Granite Wash of Permo-Pennsylvanian and several wells in the area had shows of oil and gas in the Panhandle Big Lime. There are numerous wells in Beckham County that have reported shows of oil and gas in lenticular sands in the Clear Fork.

The Hobart and Gotebo Area produce from the conglomerate at the base of the Permian at the contact with the Ordovician and from Ordovician, and the Apache pool in 5n and 6n-2w produces from the Ordovician. The Cement field in 5n and 6n-3w, produces from numerous sands in the Permian and Pennsylvanian.

Structural Trends

The dominant structural trends in most of the Basin are northeast-southwest (Figure 5) but these trends are no

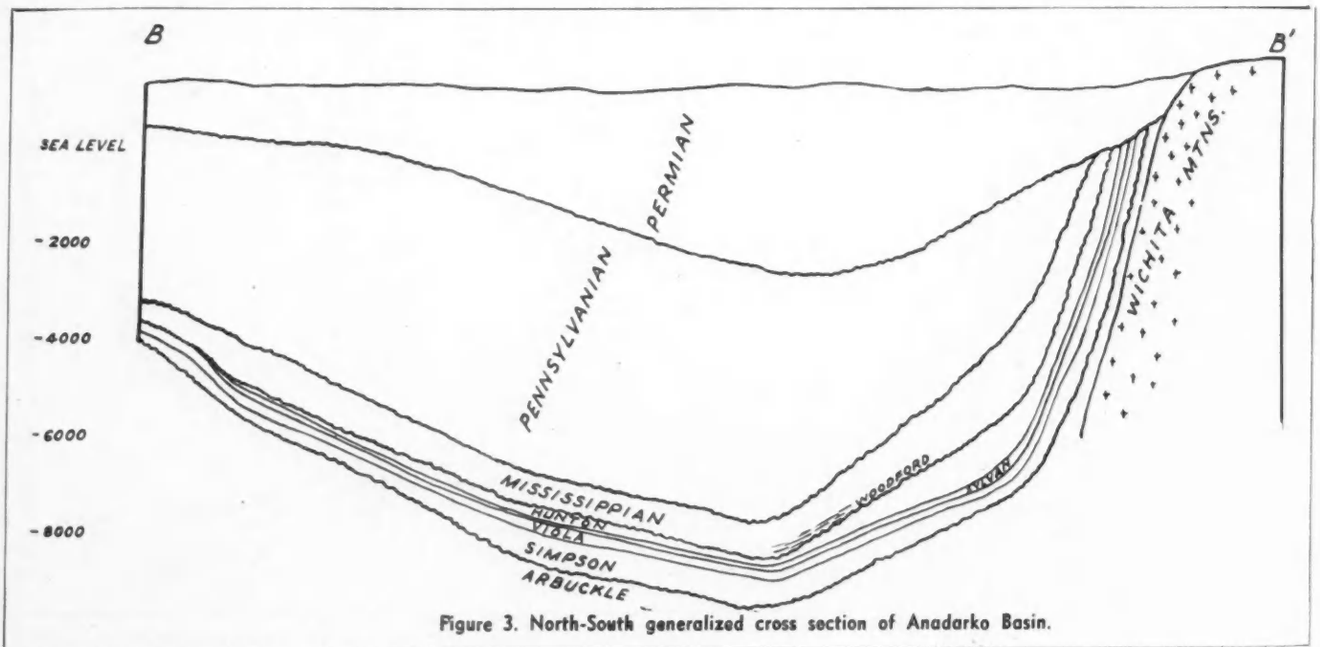
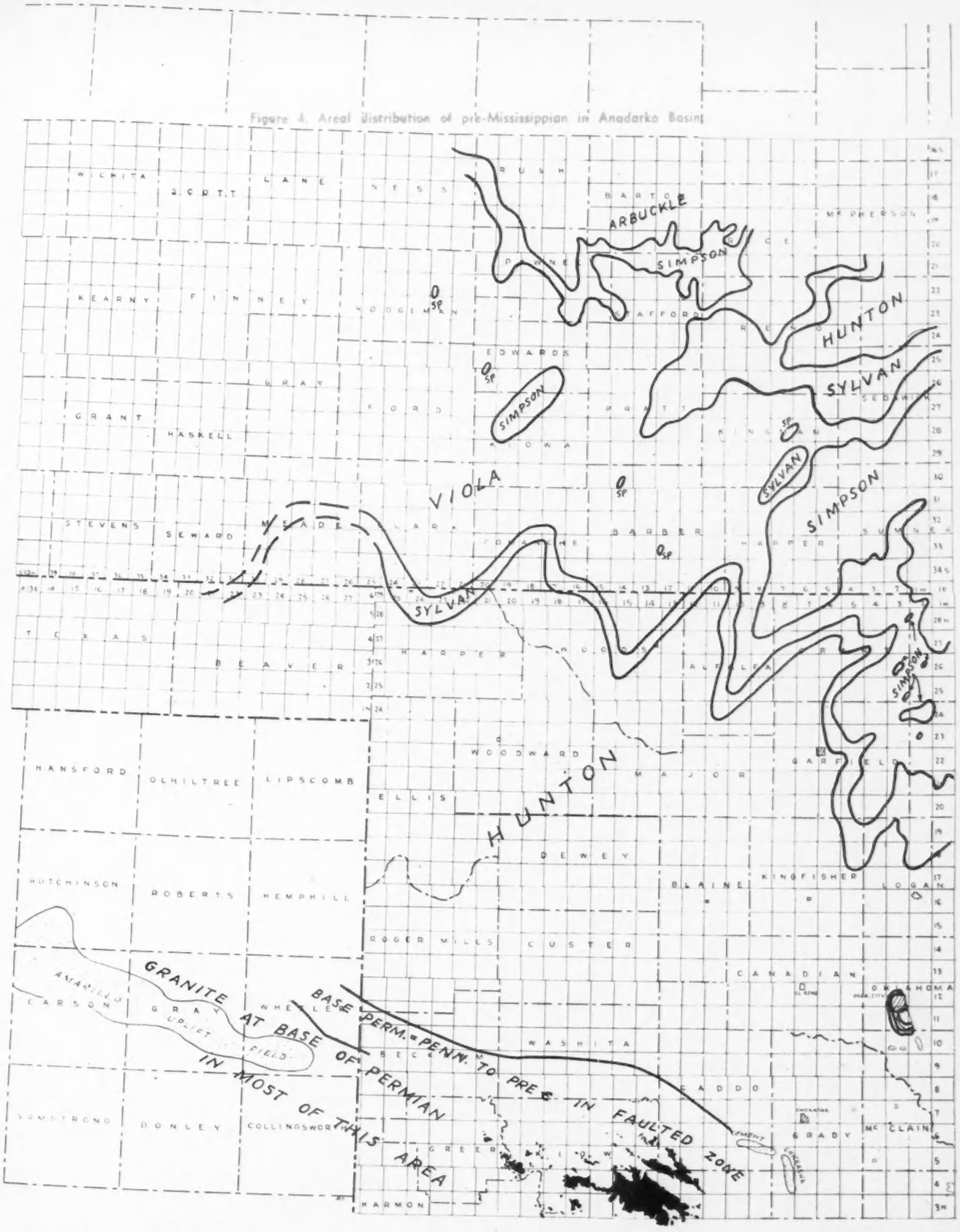


Figure 3. North-South generalized cross section of Anadarko Basin.

Figure 4. Areal distribution of pre-Mississippian in Anadarko Basin



doubt modified by cross folding that roughly parallel the Wichita-Amarillo fold. Going southward across the deepest part of the Basin and approaching the mountains the northeast-southwest folding gives way to the folding of the mountains; thus, the subordinate in the northern part becomes the dominant in the southern flank.

There is little doubt that several promising structures may be found in the area with present improved instruments in exploration as evidenced by the number of sizable blocks taken by companies after geophysical and/or core drill work. As future deep tests are drilled in the Basin the information gathered will increase the geologists' knowledge of the area. Engineers and production men will become more acquainted with those subsurface factors that present so many problems in new areas.

It is imperative that close cooperation is maintained among all those connected with the drilling of these deep tests that mean investments of $100,000 to

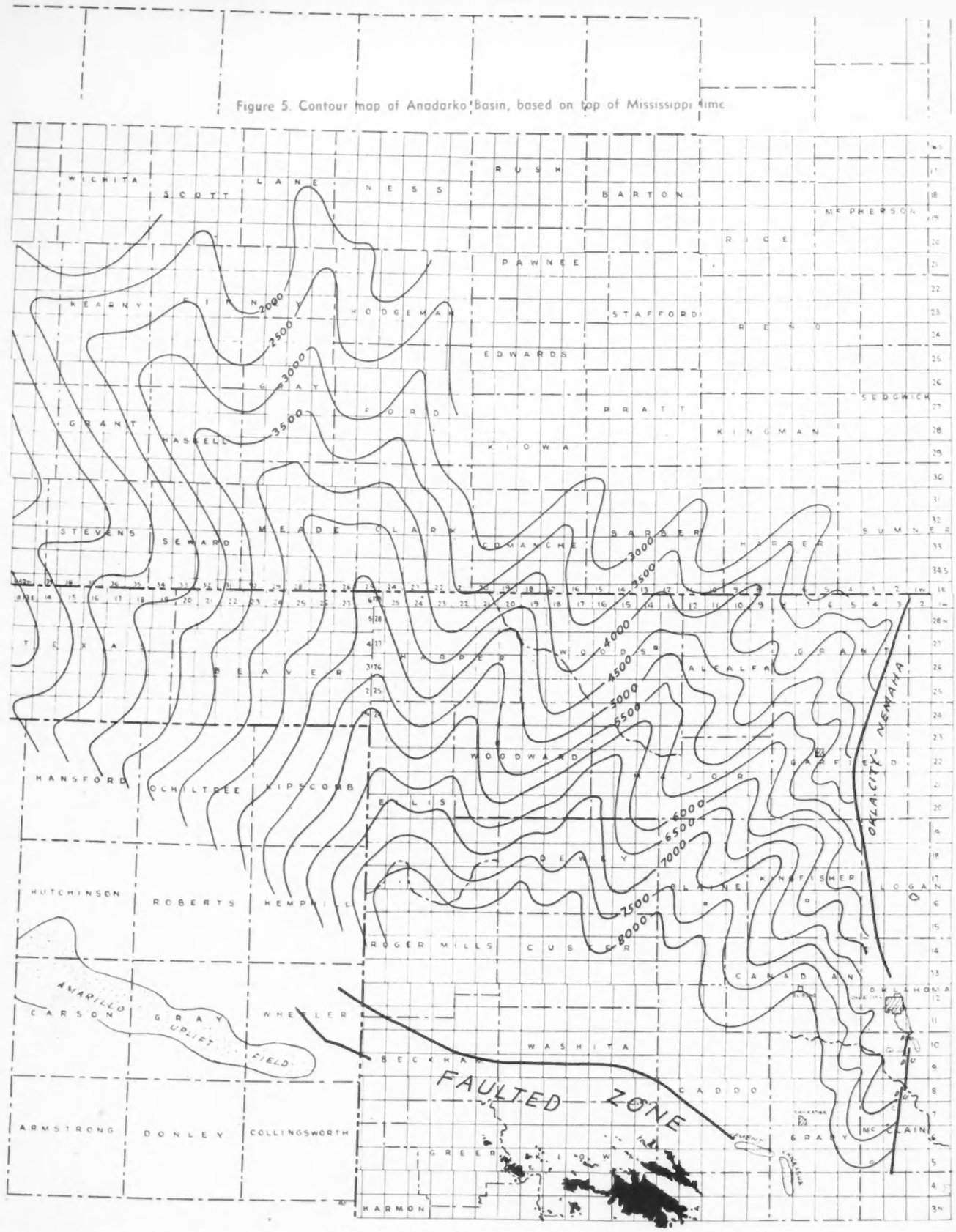


Figure 5. Contour map of Anadarko Basin, based on top of Mississippi lime

$200,000 or more. On this cooperation or team work depends the success or failure of adequately testing the Anadarko Basin.

Well spacing that will economically drain a pool and allow the operators to make a fair return return on their investment will be one of the many complex problems facing both land owner and operator in the Basin. Unlike the shallow well areas of the Mid-Continent where small acreage blocks could be drilled cheaply, the Anadarko Basin with deep and expensive tests will require large substantial blocks to warrant the operator risking such a large capital outlay. The landowners in the Basin will therefore be required to cooperate with the operator to test successfully the deep structures and keep Oklahoma in the top bracket as an oil producing state. It would not take too many Garber or Oklahoma City fields to assure Oklahoma that position and to change the pessimistic view of the alarmist on the petroleum resources of the United States.

Worldwide Supply and Demand Forecast Through 1950

By HOWARD W. PAIGE

Coordination and Economics Department, Standard Oil Company (N. J.)

IN MARKED contrast to the postwar decline in most so-called heavy industries, the production of crude petroleum and equivalents is now at an all-time peak. The present level worldwide, exclusive of Russia, is higher than the wartime peak reached a year ago by 4 percent for 300,000 barrels daily. In the U. S., production is above the wartime peak monthly production by about 1 percent, in spite of the shutback in Navy Reserve production at Elk Hills of about 60,000 barrels daily.

Relatively, refining operations are not quite as high and, therefore, crude is going into stocks this year compared with heavy drafts on crude stocks last year. Nevertheless, worldwide refinery runs are about 1 percent above the peak wartime runs of a year ago, the gains in foreign areas being more than sufficient to offset a decline in the U. S. In the U. S., runs are 175,000 barrels per day below the wartime peak, or 3½ percent. Almost all this decrease is in California, resulting from the shutback in Elk Hills production, elimination of tank car movements of West Texas crude, and reduction of local crude stocks to approximately minimum working levels. In foreign areas, however, new and rehabilitated capacity has been brought into operation to the extent of about 250,000 barrels per day. An analysis, by areas, indicates that foreign refineries are at capacity and domestic refining operations are within 1 to 2 percent of maximum economic capacity. By this I mean that, while physically considerably more crude could be refined, the added crude required could be moved to refineries only by abnormal transportation means—such as tank cars—and at prohibitive costs.

Under usual circumstances, marketers are interested primarily in the production and refining picture only to know if products are and will be available for sale. Let us then turn from refining operations to requirements.

Requirements Static

It is of interest that while overall product output was higher than last year, overall requirements are almost identical. This is evidenced by the higher build-up of stocks as compared with last year. During June of this year, for example, product stocks accumulated at the rate of about 200,000 barrels per day, while at the same time last year the stock build-up was about 150,000 barrels per day. Military requirements are, of course, far less than last year, but civilian requirements have increased almost as much as the military decreased. While crude production and refinery operations have remained fairly constant since V-J Day, retail marketing activities have increased enormously. It was the marketers who had practically all of the reconversion headaches, who still have them, and, if our forecasts are correct, are going to have some more.

In forecasting the future, we start with the present demand for products. Outside of the U. S., and again excluding Russia, we have projected an increase of 23 percent in 1950 compared with this year. In volume this is about a 550,000 barrels per day increase. Breaking this down into residual and all other products, we find that the residual increase is only 14 percent, or 130,000 barrels per day, while other products—principally gasoline, kerosine and distillates—increase 29 percent, or 420,000 barrels per day. The reason the residual increase is relatively small is that requirements in 1946 are abnormally high as a consequence of the war and the coal situation. We predict that by 1950 the increases in foreign crude production and refining will at least equal the increases which have taken place in foreign demand. The reason is apparent—foreign crude can be obtained at less cost than domestic crude. However, in 1947 and 1948 we expect foreign demand to outstrip increases in foreign refining capacity because of unavoidable delays in completing new foreign refining facilities on the large scale indicated to be required.

The projections for foreign areas are based on the assumption that political and military conditions will become sufficiently stabilized by the end of this year so that developments can proceed unhampered, except for delays in obtaining materials. It is also assumed that while the general economic situation will improve progressively throughout the period, coal supplies, because of limitations on either production or coal transportation, will not be adequate to meet all requirements. As a result, an upward trend in residual fuel oil demand through conversions from coal to oil is anticipated, which will more than offset declines in military demands. Further, it is assumed that by the end of this year dollar loans will have been made and that present foreign rationing, due to lack of dollars, will be eliminated in 1947 and thereafter.

Marketers should prepare for great increases in the consumption of all petroleum products

Most of the marketers here are interested in the foreign projections only to the extent that they influence operations in the U. S. Exports from the U. S. are the end result of the foreign supply and demand situation. Our estimates of product exports are as follows.

1946....350,000 barrels per day
1947....375,000 barrels per day
1948....400,000 barrels per day
1949....300,000 barrels per day
1950....180,000 barrels per day

Naturally, if the assumptions concerned with free trade and elimination of restrictions on consumption in foreign areas do not materialize, the exports would be lower than estimated. The significance of these figures is that while foreign demands will increase rapidly, not much new refining capacity can be completed before 1949 because of delays in obtaining materials, currency difficulties, and present political troubles in the East Indies. In 1949 and thereafter it was assumed that new capacity would be completed at a higher rate than new demands, with a resultant decrease in the purchase of relatively high cost products from the U. S. In our opinion, 1948 is the year to watch! At this time, high export requirements will be added to high domestic requirements, and facilities now in operation and under construction may not prove adequate to handle this imposing load, thereby requiring additional construction projects which at present are receiving probably only tentative consideration.

Domestic Status

Turning to the domestic picture, we find that 1946 demands are running well ahead of 1941. The civilian domestic requirements for the year, based on actual to date and estimates for the last half of the year, are compared with 1941 as follows:

Gasoline	up 5%
Kerosine	up 7%
Heating Oils and Diesels	up 18%
Residual Fuel	up 19%

It should be borne in mind that these comparisons are for civilian require-

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ments only and do not include military or export demands, which, in most cases, have increased even more over 1941.

Looking to the future, the following changes in domestic civilian requirements from 1946 are foreseen:

Gasoline: Civilian aviation gasoline requirements are expected to increase so rapidly that accurate predictions are difficult to make. In general, we look for a 1948 demand double that of 1946 and in 1950 almost three times that of 1946. Civilian use of jet propulsion fuel is not expected to be an appreciable factor in this period.

Civilian motor gasoline consumption estimates are based on the following assumptions: (1) that the number of passenger cars in use in 1948 will be 4¾ million more than the average in use this year; (2) that in 1950 the cars in use will be 33 million, which is 3 million higher than 1948 and 7¾ million higher than this year's average. Based on Census Bureau estimates of population trends, the figures we are using indicate that in 1950 there will be a car in use for every 4.2 persons compared with one for every 5 persons in 1941.

As regards consumption, the past trend reflects a continued increase in the use of gasoline per car in service. It is felt that the factors behind this trend will continue, but that the effect will be nullified by the increased fuel efficiency foreseen in cars produced in 1949 and 1950—and possibly to some extent in 1948.

Truck and bus consumption are expected to be 15 percent higher in 1950. Agricultural use, it is believed, will decline about 14 percent in this period because of a projected switch to diesel, while miscellaneous uses have been figured to increase 12 percent. The weighted average of these individual estimates results in a projected increased civilian requirement of 5 percent in 1947; 15 in 1948; 20 in 1949; and 23 in 1950 above the 1946 level.

Kerosine: Civilian demand for kerosine in 1950 is expected to be about 7 percent higher than in 1946. The principal gain will be in demand for heating purposes. Kerosine consumed by tractors is expected to decline about 2 million barrels as a result of competition from diesel units. Other uses—such as fuel for cooking, farm machines, illumination, and civilian jet planes—are forecast to increase about 2 million barrels per year during this period. The net increase in this product is small when compared with that of other petroleum products. In this respect the future pattern is similar to past trends and gives consideration to the competition this product must meet from other types of fuel—such as bottled gas, gasoline, and diesel oil.

Distillate Fuels: There are two principal categories in demand for distillate fuels—home heating and diesel engine use. In 1941, home heating use accounted for approximately 70 percent of the total domestic demand, while diesel engines used about 16 percent. By 1950 it is estimated that the relative position will have changed to about 60 percent for home heating and 35 percent for diesel engine use. In the home heating field, it is estimated that the average number of burners in use in 1946 will exceed the number in 1941 by almost 400,000, or 16 percent. In 1950 it is expected that burner installations will exceed those of 1946 by about 1,160,000, or an increase of 44 percent. The increase in fuel requirements, however, is expected to be only 37 percent during this period, mainly because of the increased efficiency expected in new burners. This increased efficiency will be important in maintaining and expanding the use of heating oil for home heating in the face of active competition from other fuels. Future projections are based on average weather, whereas 1946 is expected to be above normal as a result of relatively warm weather in the first quarter. This accounts for a small amount of the increase above 1946 projected for future years.

The use of oil by diesel motors should show a really spectacular gain by 1950. Manufacturing capacity for diesel motors was about 45 million horsepower annually at the beginning of this year, compared with a production in 1941 of 5 million horsepower. The availability of this capacity, together with the proved efficiency of the engines and product for certain type operations, and a very considerably enlarged force of experienced operators, mechanics, etc., all point to a greatly expanded use of diesel power in the postwar period.

Civilian Use

Civilian diesel fuel use is expected in 1950 to be double that of 1946, whereas the use in 1946 is double that of 1941. Large increases are expected in the category of railroads (railroad use in 1950 is projected at nine times that of 1941), vessels, smelters, mines and manufacturing industries, tractors, and construction machinery, etc. Truck and bus consumption in 1950, it is believed, will be many-fold that of 1946. Of the more than 100 percent gain anticipated in total diesel use, ¼ will be due to the construction and use of diesel-driven trucks. Adequate diesel oil distribution will, no doubt, pose problems for many marketers. Refiners, in turn, will be faced with crude and product segregation problems to obtain sufficient quantities of the relatively high quality which will be required to assure good performance.

Residual Fuel Oil: The civilian on-shore demand for residual fuel oil, excluding bunkers, is expected to increase about 6 percent in 1947 and the same in 1948 over the 1946 level. However, in 1949 it is projected to drop to the present level and fall about 1 percent below that in 1950. This is based on the assumption that industrial activity in the United States will decline in these two years, particularly in 1950. As residual requirements are determined by competition with other fuels and are, therefore, particularly sensitive to price changes, our projection was based on a continuance of the price relationship of residual and coal established during the past few months. In general, the demand is expected to be in balance with by-product residual production worldwide. As it is necessary to move by-product residual fuel oil, an increase in by-product residual production worldwide over that estimated herein would, no doubt, be accompanied by a correspondingly higher demand—with the price mechanism serving to maintain the balance between supply and demand. Similarly, if there is a shortage of by-product fuel oil production, the price might be expected to rise to reduce the demand to the by-product supply level.

In regard to other products—increases are expected in lubricating oil (19 percent), asphalt (35 percent), and miscellaneous products (about 15 percent) in 1950 above the 1946 levels. Liquefied petroleum gas consumption is expected to be 30 million barrels this year compared with 11 million in 1941; in 1950 it is projected to be 14 percent above 1946.

We do not expect agreement with all the assumptions used in this forecast—for example, economists differ widely as to the timing when a peak in the present boom will be reached. However, a study of past trends in petroleum consumption in relation to changes in business conditions indicates a considerable time lag between the two and that the ultimate effect of a change in average business conditions is outweighed by other factors which more directly affect consumption. It is for this reason that we are not too worried about disagreement in views as to the exact timing of a change in business conditions. Other things being equal, it could hardly affect any of the estimates before 1950, whereas the problems of supply and distribution will probably be most acute in 1948. The reason for this, as previously indicated, is that domestic requirements are expected to increase rapidly during the next year or two before tapering off, while exports, it is believed, will be maintained, or increased, during this period. At the same time difficulties may be encountered in obtaining sufficient materials in time to provide all of the supply and distribution facilities which would be desirable to handle the large volume of business projected.

As to the accuracy of estimates—it cannot be claimed that, over the period described, the error will be less than 5 percent plus or minus. If actual consumption turns out to be 5 percent higher than estimated, the supply difficulties in all branches of the industry will be strained to the utmost. If consumption is 5 percent less than estimated, it would still be at a much higher level than any previously experienced and will require the utilization of practically all efficient facilities.

Summarizing, estimated consumption of the major petroleum products in 1950 compares with 1946 as follows:

	Inc./(Dec.) 1950 over 1946
Foreign Requirements	23%
Domestic Civilian Requirements	
Gasoline	23%
Kerosine	7%
Distillate Oils	
Heating	37%
Diesel (Inc. Bunkers)	110%
Residual Fuel Oil	7%

In conclusion, our forecast indicates that the marketers would be well advised to prepare themselves for substantial increases in the consumption of all petroleum products, with, perhaps, the exception of residual fuel oil in certain categories of consumption. In all probability, the most rapidly expanding business will be found in such items as diesel fuels, asphalt, and many specialty products. It is an optimistic picture, but also a challenging one to the marketer if he is to maintain his past performance of providing adequate service to the public, while at the same time handling a substantially increased volume of business.

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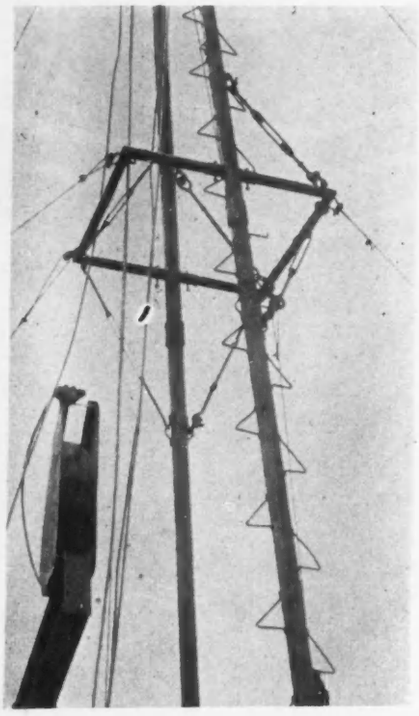
Reinforced "A" Frame Speeds Pulling Jobs



PORTABLE MASTS

An "A" frame constructed of common pipe can be reinforced to provide additional stability and strength for pulling long strings of tubing when braced in the vertical midsection with a double truss arrangement which is relatively inexpensive. The "A" frame used by one company for servicing pumping wells is built, in the main, similar to many others in use throughout the oil fields. The difference between this "A" frame and various other types lies in the midsection bracing. On each side of both vertical legs are welded short stubs of pipe which will slide into common two-inch pipe. These stubs have holes drilled through them for locking pins. Two sections of pipe, welded to form, when placed together, a rectangular frame, designed so that the open ends of both sections slide onto the short stubs welded to the legs of the frame. Pins are inserted to retain them in place.

On one corner of each section are welded bails, or eyes to attach the hooks of substantial turnbuckles, which are attached at the opposite hook into eyes welded to the sides of the leg of the frame. By drawing the turnbuckles on this side evenly a double truss is formed which stiffens the leg and prevents bending when pulling a string of tubing. The opposite side of the rectangular attachment contains only one pair of turnbuckles, attached to the leg which contain the rungs provided for men to climb to the sheaves at the crown block. Guy wires are attached to the frame at all four corners in addition to the ones looped into eyes at the crown. Disassembling is easily accomplished if required when hauling or breaking the legs down.

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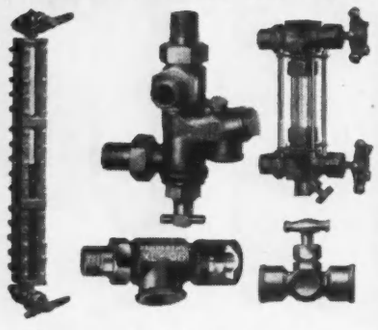
QUALITY
PRODUCTS



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See Pages 2450 to 2455, Composite Catalog

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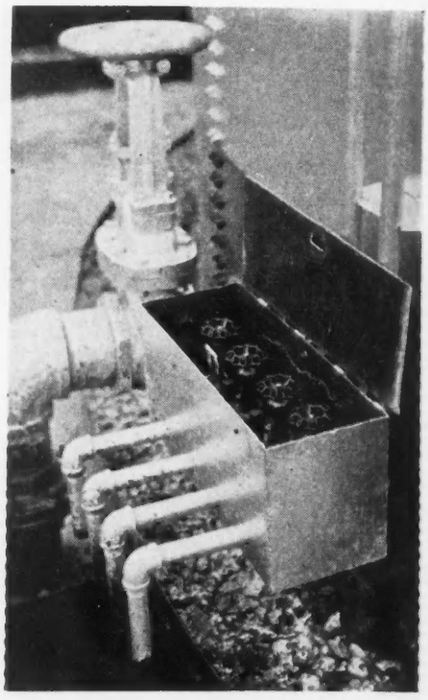
When mixing paint in quantities, it is quite difficult and requires much time to stir with a wooden paddle until the material is in condition for spraying or brushing. An effective mixer may be easily made which is operated with an electric hand drill. A half-inch rod is obtained that will fit into the chuck of the drill. One end is equipped with an impeller, either welded to the rod or fitted with a box and attached with a retaining cap-screw. Five gallon containers, or larger vessels may readily be used for mixing the batch, when a definite color is to be used on buildings or compressors, engines and pumps.

Sample-Cock Group



LEASE PROTECTION

In order to prevent vandalism on and around tank farms, one producer has devised a means of preventing any unauthorized person opening the gauge cocks on the sides of tanks. A sturdy, all-welded rectangular box was mounted on the side of the tank, the sample lines being brought in through the back side of the box, the valves mounted inside, and outlet nipples coming out the front side as shown. With hasp attached inside the container, the cover may be closed and secured with a padlock with assurance that tampering will be impossible. Neatly painted in the tank colors, the box does not detract from the otherwise clean surroundings. Outlet lines are turned down so as to be directed into a rectangular steel waste sump resting on the ground beside the valve group.

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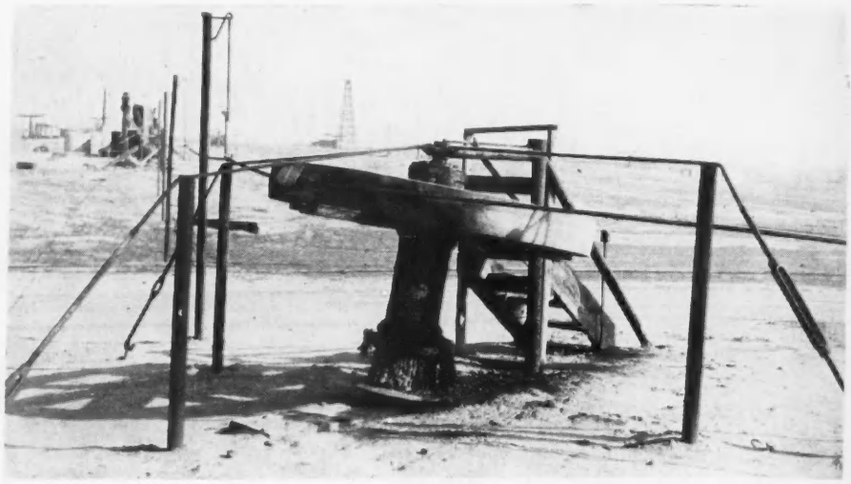


A difficult problem in laying out rod pull lines was solved in a novel but practical manner by one company. A well some distance away was to be pumped with a back-crank on another well unit. The problem was complicated by the fact that the new installation was somewhat lower than the other and was located in such an area that it was advisable to utilize some type of right-angled swing. To provide a means of carrying the motion through a 90-degree angle and at the same time change elevation of the line, use was made of a modified salvaged calf-wheel which was set up on the ground in an off-vertical position as shown. Pivoted in a socket at ground level, the wheel was anchored in its position by an overhead pipe arm, this in addition to snubbing lines on other sides of the unit. A short underground pipe having a lube supply cup at its outer end supplies the lower bearing with oil, and a similar line and cup mounted overhead supplies the upper cup with oil.

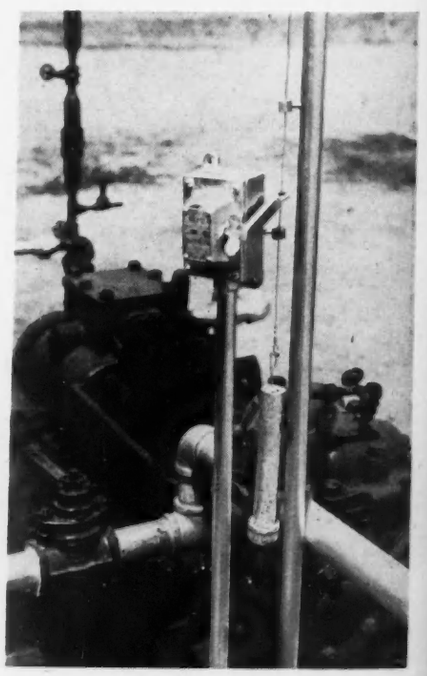
PULL RODS

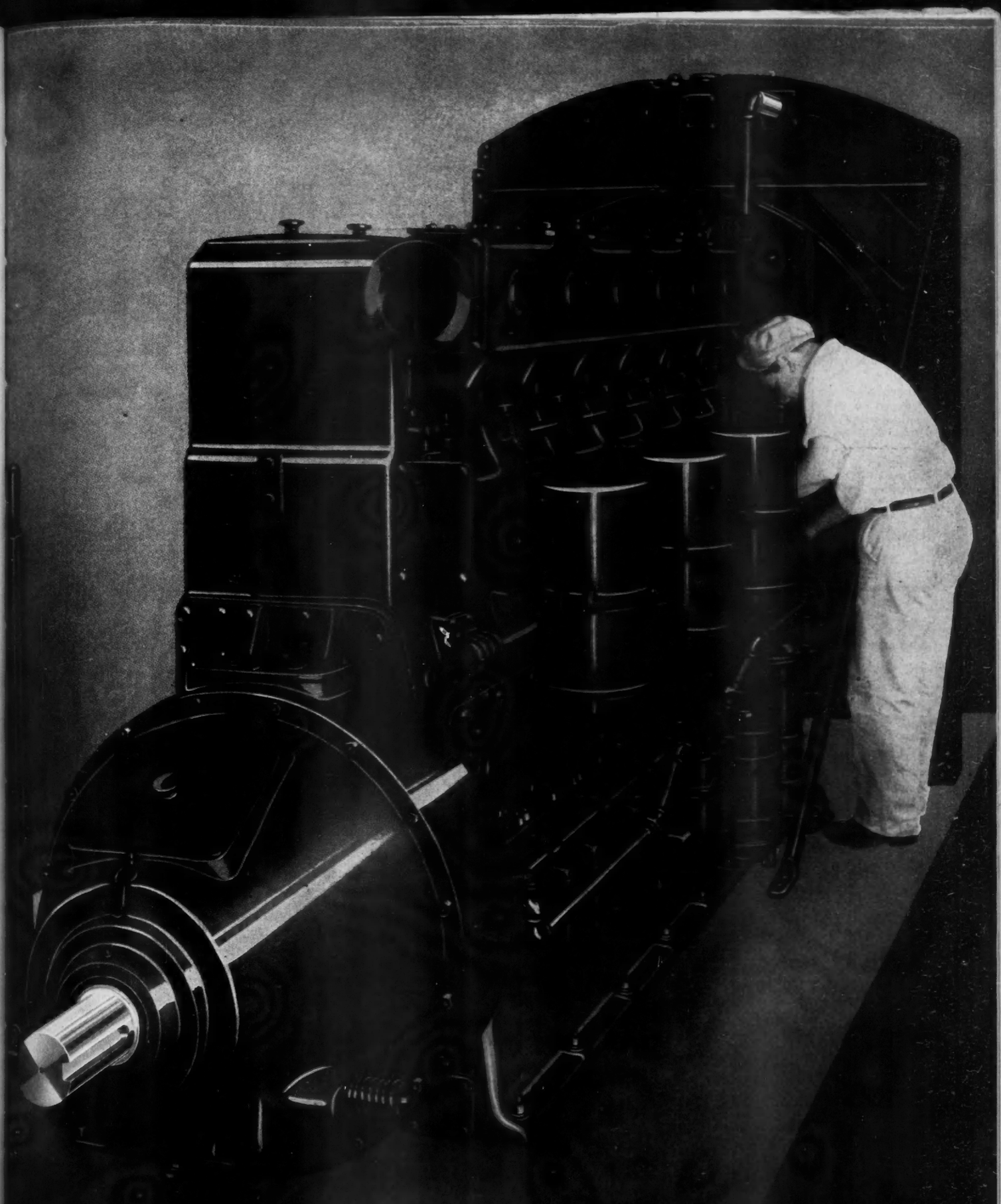
Surface of the wheel was covered with old belting, and at the mean point of contact with the line, a small sling of canvas belting was provided to hold the pull line in place throughout its complete cycle of motion.

Fluid Level Control Governs Shipping Pump

As a means of automatically controlling shipping rate and fluid level in the tank battery, one company utilizes a simple, positive-acting switch which is operated by the rise and fall of the fluid level in the tank. A light wire attached to a tank float is brought over several small pulleys to a one-inch pipe pole erected near the shipping pump. The end of the wire is weighted with a lead-filled short section of one-inch pipe. A conventional explosion-proof switch, mounted at convenient height on a pole several inches from the wire is rigged with an extension handle on its push-button lever, the end of this short handle being equipped with a ring. The float wire is run through this ring, and the setscrew stops are secured to the wire above and below the ring. The switch is tripped when either of these stops contacts the lever, the range of fluid level extremes in the tank being governed by the spacing of the easily-shifted stops up or down the wire. The weight attached to the end of the wire is sufficient to overcome the slight pull required to trip the switch on the downward movement of the wire.

FLOW CONTROL





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Crude Production Gains Moderately And Runs to Stills Decline Slightly

Crude production in the U. S. during the week ended July 13 was increased moderately from the previous week, while crude runs to stills were cut back slightly.

Increases over the preceding week occurred in the output of gasoline and residual fuel oil, while distillate fuel production was lessened. Demand for gasoline continued heavy and caused withdrawals from stocks of almost 1 million barrels, while the burning oils continued their seasonal accumulation by nearly 3 million barrels. These trends were revealed by The American Petroleum Institute in its latest weekly report.

U. S. crude production averaged 4,934,000 barrels daily during the week of July 13, an increase of 29,000 daily from the previous week, but 10,000 daily less than was produced in the comparable week of last year. This output for last year's week was the all-time high mark until it was exceeded in June of this year.

Crude runs to refinery stills for the week averaged 4,875,000 barrels daily, a slight decrease of 4000 daily from the previous week, and 93,000 barrels less than the daily runs of the like week of last year. While crude production in 1946 has reached an all-time high, crude runs have not been closer than 261,000 barrels to the peak set in mid-August last year.

Stocks of refinable crude amounted to 222,377 barrels on July 6, according to the Bureau of Mines, showing a decrease of 1,506,000 barrels during the preceding seven-day period. These current stocks are 5,127,000 barrels, or 2.4 percent, greater than those held a year ago.

The week's output of gasoline, including natural blends, amounted to 14,716,000 barrels, an increase of 365,000 barrels over the previous week, but 31,000 barrels, or .2 percent, less than the corresponding week a year ago. Withdrawals totaling 959,000 barrels were made on gasoline stocks during the week bringing them down to 90,753,000 barrels. These finished and unfinished gasoline stocks are 5,431,000 barrels, or 6.4 percent, more than stocks a year ago.

Distillate fuel oil production, down 114,000 barrels from last week, totaled 5,416,000 barrels, which is 134,000 barrels, or 2.5 percent, over the comparable week of 1945. Stocks of this light fuel oil were increased by 2,371,000 barrels during the preceding seven days, bringing them up to 41,897,000 barrels. This is 20.6 percent, or 7,157,000 barrels, more than was in storage one year ago.

Production of residual fuel oil, after being upped 62,000 barrels over last week, totaled 8,459,000 barrels, which is 1,023,000 barrels, or 10.8 percent, under the production of last year's week. Additions of 587,000 barrels were to stocks of this heavy fuel oil during the week bringing them up to the current level of 48,330,000 barrels, which exceeds stocks of a year ago by 6,543,000 barrels, or 15.7 percent.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	4,762	9-30	4,798	12-30	240,992	1- 1	89,162	4- 1	48,162	10-28	64,744	10- 7
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,879	7-6	229,430	3- 2	105,233	2-16	41,897	7-13	48,330	7-13
Lows:												
1939	[2]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 3
1941	3,354	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-13
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-18	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	220,258	9- 9	76,302	1- 1	30,232	4-19	49,737	3-18
1945	3,621	10- 6	3,409	10- 6	[4]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	90,753	7-13	25,131	3- 9	37,289	4- 6

TRENDS OF 1945 AND 1946

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1945:									
January 27	4,727	4,756	221,310	14,957	88,223	4,843	33,561	9,252	51,119
February 24	4,777	4,803	219,351	15,500	95,972	4,958	28,753	9,084	46,713
March 31	4,781	4,677	223,782	14,644	98,758	4,548	26,889	9,184	41,745
April 28	4,805	4,780	223,474	14,633	94,068	4,636	28,273	9,379	39,813
May 26	4,887	4,950	222,831	15,194	89,121	4,667	29,184	9,670	38,548
June 30	4,903	4,999	220,781	15,546	86,472	4,910	32,213	9,077	40,488
July 28	4,930	4,996	218,507	16,106	86,008	4,598	36,071	9,586	42,283
August 25	4,892	4,931	[4]211,813	15,986	84,693	4,960	39,782	9,356	46,201
September 29	4,357	3,812	222,387	11,913	79,552	3,940	43,689	7,047	46,853
October 27	4,273	4,838	224,230	15,530	74,335	5,159	43,472	8,691	45,943
November 24	4,469	4,648	219,363	15,681	83,184	4,802	45,258	8,800	47,474
December 29	4,474	4,729	218,918	14,546	95,205	5,055	36,651	8,765	42,447
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,357	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,322	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 6	4,905	4,879	222,377	14,351	91,712	5,530	39,526	8,397	47,743
July 13, 1946	4,934	4,875	.....	14,716	90,753	5,416	41,897	8,459	48,330
July 14, 1945	4,944	4,968	[5]217,250	14,747	85,322	5,282	34,740	9,482	41,787
Change:									
In Week	+29	—4	—1,506	+365	—959	—114	+2,371	+62	+587
In Year	—10	—93	+5,127	—31	+5,431	+134	+7,157	— 1,023	+6,543
In Year	—0.2%	—1.9%	+2.4%	—0.2%	+6.4%	+2.5%	+20.6%	—10.8%	+15.7%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922 due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, July 7, 1945.

THE OIL MAN'S CALENDAR

AUG. 8-9-10	Interstate Oil Compact Commission, Quarterly Meeting, Grand Rapids, Michigan, Pantlind Hotel.
SEPT. 10-12	Pacific Coast Gas Association, Annual Convention, San Francisco, Fairmont Hotel.
18-20	Oklahoma Liquefied Petroleum Gas Association annual convention, Oklahoma City, Skirvin Hotel.
OCT. 1- 2	American Association of Oilwell Drilling Contractors, Annual Meeting, San Antonio, Plaza Hotel.
3- 5	AIME, Petroleum Division, Annual Meeting, Galveston, Hotel Galvez.
7-12	American Gas Association, Annual Convention, Atlantic City, N. J.
16-18	Texas Mid-Continent Oil and Gas Association, Houston, Rice Hotel.
24-25	AIME Petroleum Division, Annual Meeting, Los Angeles, Ambassador Hotel.
24-25	American Association of Petroleum Geologists, Mid-year Meeting, Biloxi, Mississippi, Buena Vista Hotel.
28-30	Independent Petroleum Association of America, Annual Meeting, Fort Worth.
NOV. 11-14	American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.
21-23	Rocky Mountain Oil and Gas Association, Annual Meeting, Denver, Shirley-Savoy Hotel.

☆ California

Orange County Has Discovery Near Huntington Beach Field

Oil discovery near Huntington Beach field; Six Companies' test near Los Angeles airport looks like low-gravity discovery; Richfield to start another well in East Los Angeles field; well at Casmalia finds Lospe dry.

Orange County: A new oil discovery has been made a mile east of the Huntington Beach field by A. W. Lyddon, operator, whose Anaheim-Sugar 7-1 in 7-6s-10w is flowing 600 barrels of 18.3-gravity oil through 24/64-inch choke. Total depth is 6930 feet, plugged to 5550 feet. Theory is that production is from an accumulation against a fault and that the productive area will not be large. Operator has staked location for another test 2 miles northeast of the discovery well in 32-5s-10w. This well, to be known as Crew Community 1, will explore for a separate structure, rather than an extension of the recent discovery.

The entire area from the eastern end of the Huntington Beach field to the Santa Ana River has been the scene of considerable leasing activity in recent weeks. Interest was heightened by the completion of Signal Petroleum Company's Callens 1 at the west end of the West Newport field in 18-6s-10w. This well flowed 800 barrels of 25-gravity oil to the sump, cutting 30 percent emulsion through 20/64-inch choke. Intervals open are 3570-3705 and 3800-10 feet.

At West Newport Beach, Federal Oil Company and C. J. Gibson have acquired a lease on the 20-acre Deeble property. A well will be started soon.

In the Huntington Beach field, Southern Belle Oil Company has taken over the Smeltzer Oil Company's Rex 12. New operator will sidetrack fish and deepen from present bottom at 8386 feet.

Los Angeles County: The wildcat drilled by 6 major companies near the Los Angeles municipal airport, Fee 1 in 2-3s-15w, is still undergoing tests. The well is bottomed in schist at 7033 feet, with top of the schist at 6854 feet. On a test of the interval 6875-6939 feet, recovery was 1880 feet of heavy oil, 470 feet of mud and 187 feet of oil and mud. On a later test of the interval 6952-7033 feet, recovery was 6284 feet of oily mud and salt water. Hole was plugged back to 6996 feet and indications are that the operators will bring in the well.

In the East Los Angeles field, Richfield Oil Corporation staked Union Pacific Unit 2 in 8-2s-12w, ¼ mile west of its Union Pacific Unit 1 discovery well.

Union Oil Company is building rig for Callendar 98A, scheduled to be a deep test in the Dominguez field.

Santa Barbara County: Bell-Casmite Oil Company's second well to the Casmalia deep sand found the Lospe unproductive and the well, Morganti 6 in 13-9n-35w, has been plugged back from 5679 feet to 4190 feet preparatory to completion in the old Casmalia zone. The Lospe discovery was made last spring by this operator and the second well is only about 600 feet from the discovery well which produced 750 barrels of 21-gravity oil.

Kern County: In the McKittrick field, Union spudded Wellport 136, the first of a series of shallow wells to be drilled on the company's Wellport fee property.

The Superior Oil Company has completed Houchin 38-27 in the Paloma field flowing 373 barrels of 34-gravity oil through 12/64-inch choke. Depth is 11,650 feet, with shutoff at 11,415 feet. Location is in 27-31s-26e.

☆ Oklahoma

Carter Abandons Deep Tests; Maysville Area Has Dry Holes

Carter abandons 2 deep tests in McClain County; Maysville area gets third dry hole in 10 days; Coon Creek area gets extension; Okfuskee County gets new gas field; wildcat gives Cotton County third new oil pool in 3 months; Holdenville pool given extension; Major County wildcat looms as pool opener; Earlsboro area gets another oil pool.

McClain County: The Carter Oil Company has abandoned 2 deep tests in the Iron Chapel and Washington pools, which further proves the areas extremely productive in some places, but in others unproductive. Abandoned were Bingham 1, CSE SW 3-7n-3w, Washington pool, and Mary Mottinger 1, CNW SW 5-6n-3w, Iron Chapel pool. The Bingham had tested the Bromide at 10,670-675 feet for 4950 feet of salt water. Electric log was run to 10,689 feet, total depth, where the formation was found dry. The Mottinger had been declared the opener of a new zone in the Iron Chapel area, but on testing in the Hunton lime, the supposed new zone, the well went dead. Bromide was found from 10,915-956 feet, and the test was deepened to 11,006 feet and plugged back to 10,300 feet, to test in the Hunton. On a previous test in the Hunton lime, the well flowed 300 barrels of oil in 16 hours through ½-inch choke from 9967-10 feet, cutting 20 percent acid water and mud.

Garvin County: Another disappointment was registered in the Maysville area when the Mid-Continent Petroleum Corporation abandoned Menefee 1, SE SE SE 2-4n-2w, northeast of Maysville, at 7290 feet. This was the last operation

Wells Completed in the United States in Week Ended July 20, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second or third issue of each month. More detailed data on wildcats published in third or fourth issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative This Year	Cumulative Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	8	20
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	1	....
Arkansas	....	....	....	1	1	....	....	....	....	....	1	2	100	101
California	22	....	....	1	23	3	....	....	3	3	29	38	1,051	1,202
Colorado	2	....	....	....	2	....	....	1	....	1	3	4	72	17
Florida	....	....	....	....	....	....	....	....	2	2	2	....	14	10
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	2	6
Illinois	37	....	....	17	54	....	2	....	13	15	69	45	1,246	983
Indiana	5	1	....	3	9	....	....	....	1	1	10	21	245	183
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Kansas	19	8	....	6	33	....	....	....	2	2	35	41	1,124	897
Kentucky	7	....	....	5	12	....	....	....	3	3	15	19	329	267
Louisiana	16	1	....	6	23	....	....	....	4	4	27	18	693	557
North Louisiana	8	1	....	1	10	....	....	....	1	1	11	13	372	193
South Louisiana	8	....	....	5	13	....	....	....	3	3	16	5	321	364
Michigan	7	3	....	2	12	....	....	....	....	....	12	33	416	407
Mississippi	1	....	....	3	4	....	....	....	1	1	5	2	129	210
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	13	28
Montana	4	....	....	1	5	....	....	....	....	....	5	7	137	117
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	....	3
New Mexico	5	....	....	1	6	1	....	....	....	....	7	5	220	247
New York	15	....	10	....	25	....	....	....	....	....	25	25	621	601
Ohio	2	8	....	7	17	1	....	....	1	1	19	25	674	503
Oklahoma	25	6	....	10	41	2	1	....	6	7	50	53	1,416	1,305
Oregon	....	....	....	....	....	....	....	....	....	....	....	....	2	....
Pennsylvania	27	3	15	2	47	....	....	....	....	....	47	52	1,732	1,647
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	2	2
Texas	85	4	....	30	119	....	2	1	20	23	142	137	4,441	4,029
E. Tex. Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	4	84	46
Rest of E. Texas	5	2	....	1	8	....	....	....	1	1	9	7	290	123
North Texas	22	....	....	18	40	....	1	....	7	8	48	50	1,333	940
W. Central Tex.	3	....	....	4	7	....	1	....	1	2	9	8	332	258
West Texas	29	....	....	2	31	....	....	....	6	6	37	25	922	1,030
Tex. Panhandle	2	1	....	1	4	....	....	....	....	....	4	6	212	326
G. Coast, Upper	9	....	....	1	10	....	....	....	1	1	11	3	357	387
G. Coast, Lower	14	1	....	1	16	....	....	1	1	2	18	25	609	585
Southwest Texas	1	....	....	2	3	....	....	....	2	2	5	8	226	281
S. Central Texas	....	....	....	....	....	....	....	....	1	1	1	1	76	53
Utah	....	....	....	....	....	....	....	....	....	....	....	....	2	....
Washington	....	....	....	....	....	....	....	....	....	....	....	....	1	....
West Virginia	....	4	....	....	4	....	....	....	....	....	4	14	397	440
Wyoming	5	....	....	....	5	....	1	....	....	1	6	....	88	82
Total U.S.	284	38	25	95	442	7	6	2	56	64	513	541	15,176	13,865

* Includes distillate wells. † Includes salt water disposal wells.

of Mid-Continent in the area, the Davenport 1, NE NE NW 28-4n-2w, and the Hart 1, SE SE SE 23-3n-3w, having been abandoned earlier. In this same area, however, another test was promising. Carter's Eskridge 1, NE NW SW 19-4n-2w, made an estimated 8 million cubic feet of gas from the Bromide at 7224-63 feet.

Coon Creek Area: The Texas Company has given the Coon Creek area along the Oklahoma-Logan County line a ¼-mile east extension with Terrill 1, NW SW SE 3-14n-1w, on the Oklahoma County side of the pool. Cement was drilled from casing set near the top of the second Wilcox at 5970 feet, and the well flowed 285 barrels of oil in 7 hours through 1-inch choke. Crew continued to test at total depth of 5996 feet.

Okfuskee County: A new gas pool apparently has been opened by Loftis Drilling Company's Kennedy 1, NE NE NE 14-12n-9e. Situated in the area between the North Castle and the Morse pools, Hunton lime was topped at 3680 feet, and the well made 7 million cubic feet of gas from 3700-10 feet and tested a spray of oil. Testing continued at total depth of 3710 feet.

Cotton County: The third pool opener in 3 months in the area south of Walters is C. H. Featherston's Tunnell 1, NW NW NW 7-4s-10w. Sand pay was found at 1309 feet, and when put on pump the well made 200 barrels of 36-gravity oil per day. Total depth is 1319 feet, with 7-inch pipe set on top of the sand.

Hughes County: The Holdenville pool has been given a ½-mile east extension by I. V. Horner et al's Williams 1, SW NW NW 6-7n-9e. The well made 1½ million cubic feet of gas, with a slight show of oil in the Booch sand, from 2772-2802 feet, the formation being topped at 2770 feet. On a following test the well flowed at the rate of 150 barrels of oil per day, and the gas flow was increased to 5 million cubic feet. Total depth is 2820 feet. Associated with Horner in the test is the Midland Co-Operative Association of Cushing and Minneapolis.

Major County: Possibility that a new oil pool may be opened 6 miles northeast of the Ringwood discovery well of The Superior Oil Company loomed as Wilcox Oil Company's Coulter 1, CSW NW 15-22n-9w, showed good stains and odor. The showings were made in the Mississippi lime, from 6610-22 feet, and the crew is now drilling below 6631 feet, heading for the Wilcox sand, expected around 8300 feet.

Seminole County: Winona Oil Company and Mealey-Wolfe Drilling Company have opened a new oil pool with Coesee 1, NW NE NE 27-9n-5e, between the South Earlsboro and the West Seminole pools. The well cleaned out and swabbed 105 barrels of oil in 24 hours after a 60-quart shot from 3485 to 3490 feet in the Earlsboro sand.

Oklahoma Leases Sold

Max Pray, Chicago operator, has purchased leases on 370 acres of land in the North Lindsay pool area of McClain County, Oklahoma. Consideration was approximately $3,400,000 in cash and oil, according to V. L. Crowell, Ada, Okla., who represented Pray in the transaction. The purchase includes 260 acres, mostly in the east half of 23-5n-4w, owned by W. B. Osborn, John Fleet, and Howard Fleet.

☆ Kansas

Deerhead Pool Is Extended; Paden Due for New Pay Zone

Deerhead pool extended ½ mile northeast; new pay zone apparent in Paden pool; Huber and Cities Service complete Skinner pool well; Butler County wildcat apparently is a pool opener.

Barber County: Gas production of the Deerhead pool has been extended ½ mile northwest by Champlin Refining Company's Larkin 1, CWL SW NE 23-32s-15w. The well was recently completed for 40 million cubic feet of gas from the Maquoketa, at 4958-89 feet. Total depth is 4889 feet.

McPherson County: Anderson-Prichard Oil Company is believed to have found commercial oil production in the Viola lime formation in the center of the Paden chat pool. The Schulz 5, NE NW NW 15-18s-1w, is showing oil from Viola at 3156 feet. About 240 feet of oil rose in the hole when a drill-stem test was taken from 3151-56 feet, and pipe is now being set on top of the Viola, preparatory to testing. Should this well be completed in this formation, it will be the first deep pay well in the northeast sector of the county.

Skinner Pool: The J. M. Huber Corporation and Cities Service Oil Company have completed the Mills 1, NW SW SW 9-31s-14w, for 1418 barrels of oil daily, with production from the Maquoketa at 4360-64 feet. In its last test following acid treatment, the well flowed 40 barrels of oil an hour.

Butler County: J. P. Gaty's Schowalter 1, NE NW SW 23-28s-3e, apparently will open a new pool, with production from the Simpson sand. Kansas City was topped at 2316 feet and the Mississippi at 2783 feet. The hole filled with 1000 feet of oil overnight while a tank was being moved in and crew is now rigging to drill plug. Five-inch pipe was set to 2994 feet in the Simpson.

☆ Ohio

Muskingum County Pool Has Gas Well from Clinton Sand

Clinton sand gas well in Salt Creek pool; southwest Hopewell test extends gas pool; second test in southern Deerfield is failure; large gas wells in Canton.

Muskingum County: B. G. Davis' Orval Maxwell 2, NE NE 32, Wayne Township, ¼ mile south of Janusz 1, a Medina sand oil well, made 4¼ million cubic feet of gas while drilling the Clinton. Drilling was completed 22 feet in at 4220 feet.

Perry County: Bradford Producing Company's Massuros-Pappas 1 NE NW 32, Hopewell Township, stopped drilling at 3058 feet, 30 feet in the Clinton sand, with a gauge of 1 million cubic feet of gas. This makes the company's third test of the area, all gas wells.

Morgan County: Ohio Fuel Gas Company's A. M. Bankes 1, NW 27, Deerfield Township, ¼ mile west of its discovery on Geo. Carr, found only a trace of Clinton sand and water in the Medina sand. The company will make another test ½ mile due south on Frank Kuntz.

Stark County: Between 35 and 40 rigs are drilling in and around the city of Canton, mostly on small tracts. Harry Dempsey's Union Metal Manufacturing Company 1, NE NE 3, Canton Township, made 6 million cubic feet of gas natural. Dempsey's Union Metal 2, SE SE 34, Plain Township, made 3¾ million.

☆ Illinois Basin

Wildcat Spudded South of New Coles County, Illinois, Pool

Wildcat spudded near Coles County, Illinois, pool opener; Hoosier pool, Clay County, has new pay; Friendsville pool extension try gets production test; Posey County, Indiana, has new oiler; Kentucky test to be state's deepest.

Illinois

E. A. Obering has spudded a wildcat, Biemer 1, SE NE NW 26-14n-7e, Coles County, ½ mile south of Vincent Nolan's Coombes Estate 1, which opened a new pool with small production in the Rosiclare sand.

Another test holding interest is S. H. and K. Drilling Company's Anna Strong 1, SE of C 22-12n-7e, Mattoon pool, slated for a test of Devonian lime. The well originally was drilled to the Cypress sand and casing set. However, plug was never drilled and the operators will knock out plug and drill to the lime, expected near 3100 feet. Total depth of old hole was 1975.

Clay County: R. and B. Drilling Company's Stanley 1, NW SE NE 11-4n-7e, has given the Hoosier pool a new horizon in the Aux Vases sand. Completed at 2842-93 feet, the well made 109 barrels of oil and 165 barrels of water in 24 hours without a shot. Total depth is 3003 feet.

Wabash County: G. S. Engle's Guisewhite 1, SW SW SE 23-1n-13w, approximately ¾ mile from production in the Friendsville pool, is being placed on pump for production test of McClosky lime at 2599-2606 feet. The well showed 50 feet of oil per hour without acid in early tests. Shows of oil were recorded in the Benoist at 2444-62 feet and the O'Hara at 2580-84 feet.

Marion County: An attempt to revive the old Benoist sand pool at Sandoval failed when Paul Doran abandoned Guyon 1, SW NW NW 9-2n-1e, at 1670 feet, through Rosiclare.

Bond County: Prospects of a new pool were fading at Luttrell and Doran's Root 1, SE SE NE 16-6n-4w, north of Greenville. Little fluid was found in the hole after operators acidized for the second time with 5000 gallons in the Trenton lime.

Wayne County: M. J. Mitchell was preparing to test McClosky lime at Keeler 1 NE SE SW 21-1s-5e, a mile northwest of Keenville pool production. The well showed for production in McClosky at 3120-25 feet.

Effingham County: Gilliam and Aspin's Rinehart 1, SE NW NW 27-5n-7e, ½ mile north of the Bible Grove pool, has set casing for production test of Cypress sand at 2537-47 feet. During a drill-stem test the well showed 65 feet of oil and 165 feet of gas in an hour.

Indiana

Paul Rossi's Rippey 1, SE SE NW 30-6s-13w, Posey County, a mile south

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The simple diagrams on the right show clearly why the ordinary, *straight-sided* V-Belt gets *excessive* wear along the *middle* of the *sides.* They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight sided V-Belts can *possibly* give.

Straight Sided V-Belt

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Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

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of the Farmersville pool, has been completed in Pennsylvania sand at 1432-44 feet for 50 barrels of oil and 19 barrels of water daily.

Kentucky

California Oil Company's Spears 1, 13-L-57, Lincoln County, a rank wildcat drilling with heavy rig, is below 350 feet and headed for the St. Petersburg sand or granite for the state's deepest test. Twenty-inch surface casing was set at 212 feet.

☆ Michigan

Pure's Isabella County Test Is Coldwater Field Extension

The Pure Oil Company's Shook A-1, N½ NW SW 5-15n-6w, Isabella County, flowed 101 barrels of oil in 15 hours from Dundee dolomite at 3754 feet, pushing the southwest border of the Coldwater field 1320 feet south. It marked the 68th (40-acre units) Dundee producer for the pool, discovered 2 years ago.

Allegan County: J. E. Hood's Taylor 1, NE SW SE 20-1n-16w, 3 miles northwest of the Casco pool, logged Traverse at 1101 feet and at 1103 feet flowed 15 barrels of oil after standing 12 hours. It will be acidized.

Cook and Sleep's Reynolds 1, NE SE SW 15-3n-13w, flowed 253 barrels of oil net after acidizing Traverse lime at 1679-81 feet to extend the Monterey-Brenner pool ½ mile southeast.

☆ New Mexico

Structurally Low Paddock Outpost Flows from Yeso

Paddock field registers deeper pay when structurally-low outpost flows from the Yeso, Eunice townsite Yeso area expanded south, Ordovician production in Brunson area defined on southeast by high granite.

Lea County: Repollo Oil Company's State 1-367, C SW SW 36-21s-37e, north offset to Glorietta production in the Paddock field and structurally low, has cemented 5½-inch casing at 6541 feet, or 1 foot off bottom, after showing for a flowing producer from the Yeso at 6442-6506 feet. The formation hardened below 6506 feet. The Glorietta was entered at 5123 feet, with elevation 3372 feet, and tested water, while the Yeso (Tubb) was topped at 6090 feet. Top of the pay correlates 24 feet low to the nearest of 5 Yeso producers in the Eunice townsite sector. The 1⅓ miles interval is being explored by 2 tests. Repollo's Simmons 1, 1⅛ miles north by east of its Yeso strike, was drilling at 7480 feet, having correlated low and dry on the Glorietta and Yeso.

Mid-Continent Petroleum Corporation's Owen 1, ¾ mile southwest of nearest Yeso production in the Eunice townsite area, landed 5-inch casing at 6600 feet to complete through perforations after spraying oil through tester at 6401-6500 feet.

Brunson Field: Magnolia Petroleum Company's Brunson-Argo 12, near C SE NW 9-22s-37e, southeast edge of the 7-well Ellenburger field, failed to encounter Ellenburger, according to revised formation analysis, in entering granite at 7463 feet, with elevation 3432 feet. A small amount of oil was recovered from Simpson after nitro shot and acid treatment. It will be completed through perforations from the 6500-foot Yeso.

Wildcats: DeKalb Agricultural Association's Lewis 1, C SE SW 13-10s-25e, Bitter Lake 9032-acre unit, Chaves County, was drilling igneous rock at 5612 feet. The Pennsylvanian was entered at 5070 feet, and granite wash at 5493 feet, while first granite was logged at 5526 feet. Magnolia's Black Hills Unit, Chaves County Ellenburger prospect, was running pipe at 708 feet. In DeBaca County, The Pure Oil Company's Federal 1, C NW NE 31-3n-28e, was drilling anhydrite at 3470 feet, having logged nominal evidence of asphalt oil in the Blaine, topped at 1840 feet.

☆ West Texas

Andrews, Winkler Test Show For Clear Fork Producers

Wildcats in Andrews and Winkler counties showing for producers from Clear Fork; second Devonian completion for Keystone field is on northwest edge of structure; confirmation well for Penwell-Ellenburger area checks low.

Discoveries: The Texas Company's University 1-P, C SW NW Sect. 15, Block 12, and 6½ miles northwest of the Martin multi-pay field, nearest production, swabbed ½ barrel of oil hourly on preliminary test of Clear Fork (Fullerton) perforations at 7170-7250 feet. A flowing producer is anticipated after acid treatments. This discovery was drilled to 8404 feet in dry Mississippian. It is credited with 129 feet of effective pay in the Clear Fork, topped at 7140 feet. Eight additional tests on separate 160-acre leases are under way, else will be started promptly to try to forestall November 14 lease expirations.

Hunt Oil Company's Hill-Gulf 1, southwest corner of SE PSL 9, Block B-11, and 1⅝ miles east of the Weiner field, responded to treatment with 500 gallons of mud acid through Clear Fork perforations at 6160-70 feet by swabbing ½ barrel of oil hourly. The zone will be treated with regular acid under pressure before testing the main pay higher in the section, topped at 6076 feet. This wildcat was originally abandoned by Gulf Oil Corporation at 4170 feet, and nearby lease owners helped to finance its deepening to 8821 feet.

Kent County: Humble Oil & Refining Company's Moore 1, ½ mile west of its Polar pool discovery, was abandoned in sulphur water at 7978 feet, having entered the Ellenburger at 7840 feet, or 74 feet low. The company is starting Elkins 1 about ¾ mile northeast of the producer. American Liberty Oil Company's Connell-Young 1, 1⅜ miles northwest of the discovery, was drilling at 4580 feet and correlating 11 feet high on the Clear Fork.

Menard County: Warren Petroleum Corporation and T. F. Morrow's Russell 1, C NE NE Sect. 18, S. Wallick Survey, A-1478, and first commercial oil producer for the county, was awaiting pumping unit after indicating a 50 to 75-barrel well on swabbing test. Production is from Canyon at 2281-2309 feet. Rig has been skidded ¼ mile west for a scheduled Ellenburger test. The owners control the area with a 10,000-acre block.

Andrews County: Placid Oil Company and Gulf's Thornberry 1, 4½ miles northeast of Ellenburger production in the Martin field, will install casing pump to try for completion after swabbing 28 barrels of 39.6-gravity sour oil and 318 barrels of sulphur water on 13-hour test following treatment with 2500 gallons of mud acid. Production is from Ellenburger perforations at 11,941-955 feet. If it qualifies as a pumper it will be the deepest producer in West Texas.

South Fullerton-Devonian Field: Gulf's University 2-D-Z, ¼-mile south outpost and 279 feet low on Devonian, topped at 8678 feet, was running pipe to complete after showing for a prolific well, with 2 oil pays above. A drill-stem test of the Devonian at 8678-8752 feet resulted in a flow of 60 barrels of 45-gravity oil the last hour, with gas volume rated at 1,533,000 feet daily, or ratio of 1057/1. Due to its low position this well encountered Pennsylvanian pay at 8280-8325 feet, with drill-stem test yielding flow of 24¾ barrels of 42.3-gravity oil, with gas-oil ratio of 954/1, the last 60 minutes. However, salt water was recovered from drill-pipe. The 7000-foot Clear Fork pay, which has been passed up by 4 completed Devonian wells in the area, recorded steady oil flow through tester. In excess of 60 wells are due to be drilled to the Clear Fork from subsurface information now available, as this pay is confirmed along a northwest-southeast trend for 3½ miles. Two Clear Fork producers in the southeast sector are a mile apart.

Winkler County: Sun Oil Company's Keystone 2, northwest edge of production in the Keystone area and 5¼ miles northwest of the single Devonian producer, flowed 214 barrels of pipe line oil initial through ¼-inch choke after acidizing with 4000 gallons through Devonian perforations at 8035-8115 feet and 8120-26 feet. This outpost failed in the Ellenburger, and was pumped for a year from Silurian. It will require 3 offsets and the latter will call for progressive offsets. Numerous Ellenburger producers passed up oil flow in the Devonian, which may embrace a larger producing area than the lower pay. The Devonian discovery on the east side of the structure has been assigned 3 offsets. Humble's Walton 1-E, C SE NW PSL 20, Block 7, and offset to Ellenburger producer at 9725-10,057 feet on the west side of the field, was drilling Simpson at 10,525 feet. Chances for Ellenburger production are remote.

Ector County: American Republics Corporation's T. P. Land Trust 1, ⅝ mile southeast of the Murchison discovery marginal pumper in the Devonian, was drilling at 7920 feet. The base of the Permian was tentatively called at 7810 feet, or 63 feet high. However, it correlates 27 feet low on the Clear Fork.

Humble's R. B. Cowden 1-C, ¾-mile south of the Devonian discovery for the North Goldsmith field, was preparing to perforate for completion with 5½-inch casing on bottom at 8049 feet in Devonian, topped at 7925 feet, or 10 feet low. This confirmation well produced gas to surface within 10 minutes, and recovered 4770 feet of sour crude when tester was used at 7971-8049 feet.

Upton County: Plymouth Oil Company's Alford 1, Lot 2, Section 50½, P. B. Scott Survey, and 10 miles northwest of the Big Lake field, was clean-

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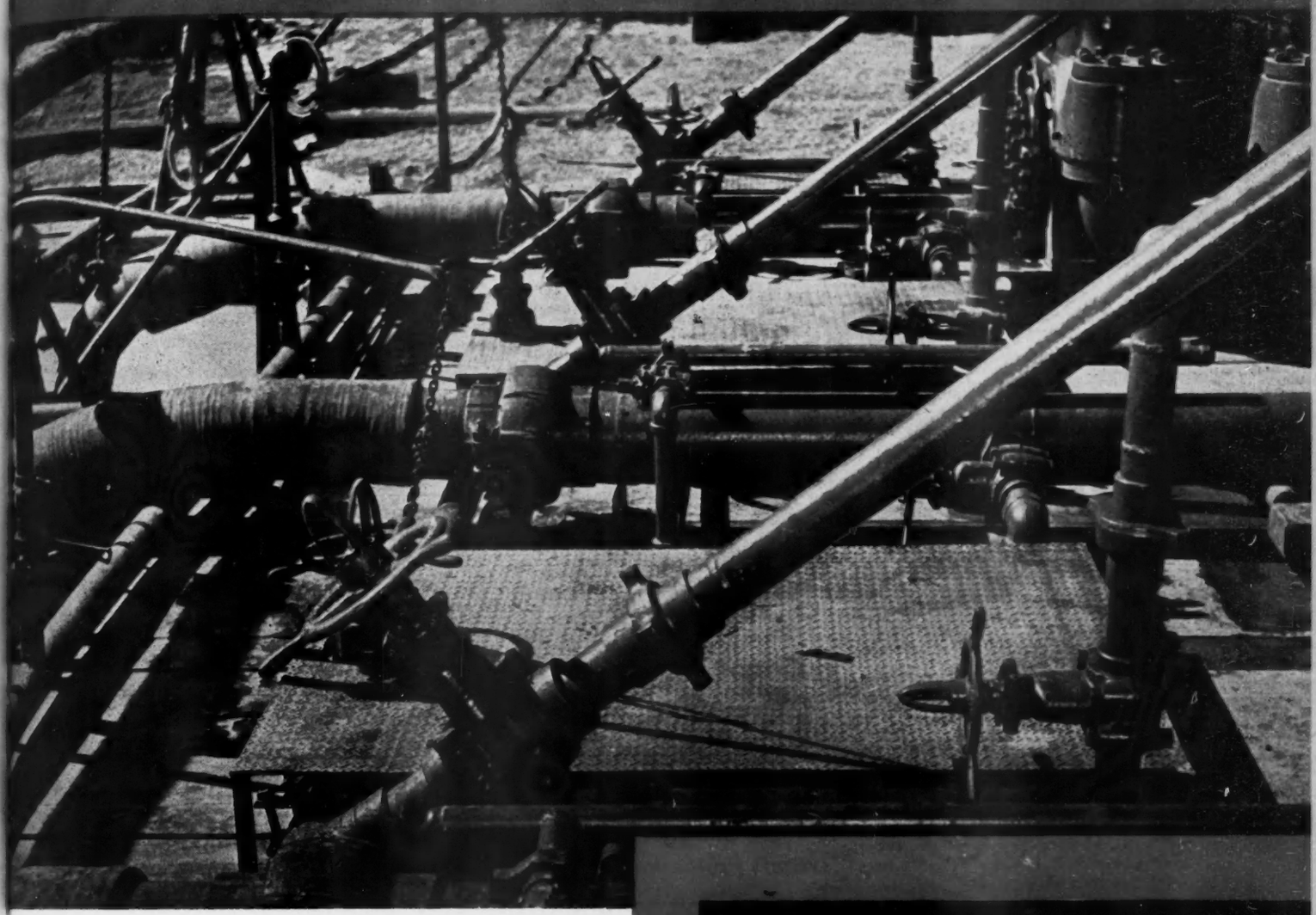
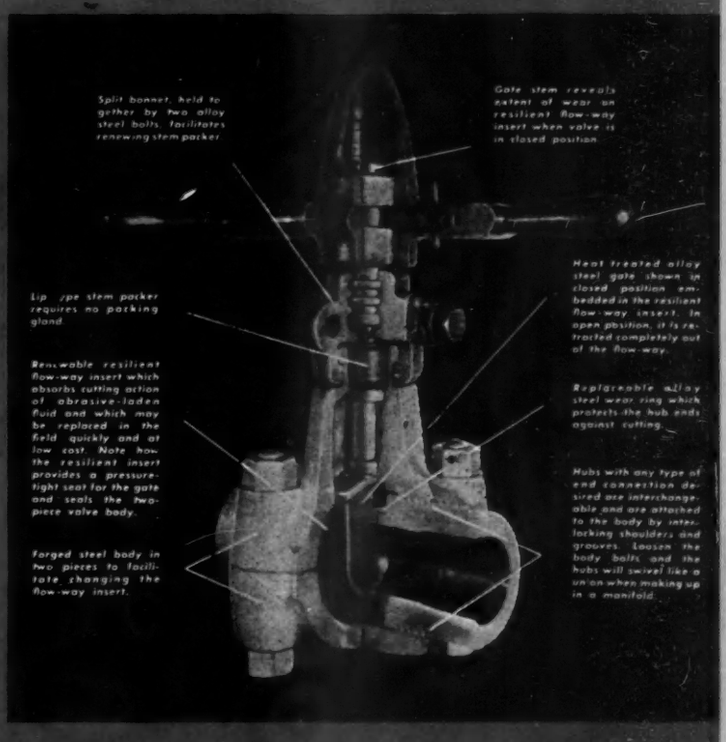


Not even Cameron Flex-Seal Mud Line Valves, with their remarkable record for long life and trouble-free performance, can stay in service indefinitely without repairs. When that time comes, however, you won't have to take your "Flex-Seals" out of service and send them to a valve repair shop. Any roughneck can completely overhaul a "Flex-Seal" right at the rig. No special tools or skill are required.

Cameron Flex-Seal Mud Line Valves were designed to do a specific job . . . provide a pressure-tight closure in a mud line when called upon and to resist the cutting action of abrasive-laden drilling fluid moving at high velocity. Consequently, the conventional metal-to-metal seat was replaced by a renewable resilient flow-way insert which slowly absorbs the abrasive action of the fluid and, after long service, may be quickly and easily replaced at low cost.

The cross-section view of a "Flex-Seal" at right clearly illustrates its unique design and shows the gate in closed position. Trash or other foreign matter trapped in the valve is embedded in the resilient flow-way insert when the gate is closed, so that a pressure-tight seal is assured at all times.

Complete details will gladly be sent to interested operators on request.


Split bonnet, held together by two alloy steel bolts, facilitates renewing stem packer.
Gate stem reveals extent of wear on resilient flow-way insert when valve is in closed position.
Lip type stem packer requires no packing gland.
Heat treated alloy steel gate shown in closed position embedded in the resilient flow-way insert. In open position, it is retracted completely out of the flow-way.
Renewable resilient flow-way insert which absorbs cutting action of abrasive-laden fluid and which may be replaced in the field quickly and at low cost. Note how the resilient insert provides a pressure-tight seat for the gate and seals the two-piece valve body.
Replaceable alloy steel wear ring which protects the hub ends against cutting.
Forged steel body in two pieces to facilitate changing the flow-way insert.
Hubs with any type of end connection desired are interchangeable and are attached to the body by interlocking shoulders and grooves. Loosen the body bolts and the hubs will swivel like a union when making up in a manifold.

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ing out to test several prospective deep pays in drilling to 10,384 feet, in Devonian, topped at 10,018 feet. It has been inactive since May, 1942, with pipe at 9750 feet.

☆ Central West Texas

Humble's Jones County Test May Be Ellenburger Pumper

Southwestern Jones County Ellenburger prospect may make pumper; Erath County wildcat shows oil and water in Ellenburger; 2 wells testing in Manning-O'Connor field, Stephens County.

Jones County: Humble Oil & Refining Company's Bishop 1-B, NE NW T&P Ry. 22, Block 19, was swabbing a small volume of oil with diminishing amount of water from Ellenburger after plugging back by stages from 5684 feet, with pipe at 5409 feet. This wildcat entered the Ellenburger at 5394 feet, logging several thin zones of porosity in drilling to water. The company has drilled 5 of the 11 Ellenburger tests in the county, and Bishop 1-B is the first to offer promise of yielding production. Mantex Oil Company's Manley 1, T&P Ry. 72, Block 14, a failure in the Ellenburger at 4889-5025 feet, has been abandoned after an unsuccessful test of an oil show at 3728-40 feet.

Hunter & Hunter's Steele 1, Lot 7, Robt. Smith Survey 192, and 2¼ miles west by north of the partnership's Fields 1-B, Ellenburger failure at 4985-5156 feet. Entered the Bend at 4723 feet, or 11 feet high. It will be deepened, using cable tools.

Erath County: T. G. Jackson et al's Migel 1, W. B. Waggoner Survey, bailed a small volume of oil and water at 3850-54 feet in Ellenburger, topped at 3776 feet with elevation of 1527 feet, and was drilling Dolomite at 3910 feet.

Stephens County: Fred M. Manning, Inc.'s O'Connor 1-D, NW NW T&P Ry. 51, Block 7, east offset to the flowing oil discovery for the Manning-O'Connor field, entered the Bend at 3369 feet, or 62 feet low, and tested gas after acidizing perforations at 3404-09 feet. It will be deepened through the gas-cap encountered by the discovery to try for oil production.

Woodley Petroleum Company's O'Connor 1, Sect. 53, ¾ mile southwest of the discovery, entered the Bend at 3383 feet, or 113 feet low, and was testing through perforations with pipe on bottom at 3392 feet.

☆ North Texas

Southern Archer County Deep Area Gains Third Oil Horizon

Southern Archer County deep area gains third oil horizon; official gauge given Mississippi discovery in Young County; Grayson County wildcat is drilling dry Simpson.

Archer County: H. W. Snowden Oil & Gas Company's Morrison 2, west offset to a 4500-foot Bend flowing well in Burns-Benson field, was showing for a 75 to 100-barrel producer after nitro shot in Strawn sand at 4316-40 feet. The firm's Morrison 3, east offset to the Bend well, was awaiting production test at 4342 feet, having logged Strawn saturation at 4310-16 and 4320-26 feet. Operations are under way on Morrison 5, while locations have been made for 2 other tests. This area also produces from the Mississippian. L. T. Burns et al's Andrews 3, Sect. 50, W. Lockhart Survey, and 2 locations north of the Bend discovery, flowed 142 barrels daily through choke after nitro shot and acid treatment of Bend at 4493-4504 feet.

L. T. Burns et al's J. H. Turbeville 1, R. Hackett Survey A-175, and 4½ miles northwest of Archer City, was testing oil sand at 1253 feet after indicating a new pool opener. It is within a cluster of failures.

Grayson County: Standard Oil Company of Texas' Mitchell 1, Sherman prospect, was fishing at 9790 feet in dry Simpson, topped at 9298 feet.

Young County: A. R. Dillard et al's Killian 1, recent discovery, flowed 280 barrels, gas-oil ratio 250/1, through 1-inch choke from Mississippi perforations at 4944-60 feet. Dillard et al's Killian 2, ¼ mile east, was drilling at 2720 feet.

Indian Leases Sold

Twenty-seven tracts were sold of the 107 offered at a lease sale of lands of the Five Civilized Tribes in Muskogee, Okla. The 27 tracts comprised 2235.96 acres of the 7749.67 offered. Highest price per acre was paid by Edwin C. Cox and Jack L. Hamon of Dallas, who offered $41.25 per acre for a 10-acre tract comprising NE NE SW 27-1s-4w, in Stephens County.

Republic Buys Leases

The Republic Natural Gas Company paid the top price for oil and gas leases at the State School Land Commission sale at Oklahoma City. A bid of $10,000 and agreement to drill a well on the NW of 16-6n-17ecm, about a mile east of production in the Guymon sector of the Hougoton gas field in Texas County was the highest offered during the sale.

☆ East Texas

Humble's Smackover Prospect Cements Protection String

Smackover prospect on northeast side of Hawkins field lands protection string in Georgetown; Travis Peak failure listed for Cherokee County; Offset to Mount Sylvan field discovery improves its structural position.

Wood County: Humble Oil & Refining Company's McKnight 1, W. R. James Survey and a Smackover test for the northeast flank of the Hawkins field, prepared to resume drilling after cementing protection string of 9-inch in top of the Georgetown at 5476 feet.

Magnolia Petroleum Company's Malone-Taylor Unit 2, John Polk Survey and a Paluxy failure for the Menziel field, renewed testing broken saturation in the Dexter series of the Basal Woodbine. Initial perforations at 4786-88 and 4762-64 feet showed water. This test also showed heavy oil in the Sub-Clarksville at 4067-78 feet.

Freestone County: Hunt Oil Company's Andrews-Pure 1, Jacksonville area, was abandoned at 9876 feet in Travis Peak, topped at 9660 feet.

Hunt County: K. L. McHenry et al's Neely-Magnolia 1, J. E. Clark Survey, was drilling sandy-shale at 5310 feet in the Rodessa.

Smith County: Humble's Dowell 1, east offset to its Paluxy discovery for the Mount Sylvan area, was drilling at 6880 feet in Georgetown, topped between 5958-89 feet. Its structural position is somewhat improved after checking about 40 feet low on the Woodbine. A producer is anticipated.

Wildcats: Delta Drilling Company et al's Houston-Magnolia 1, Martin's Mill prospect, was drilling at 4850 feet in the Woodbine, topped at 4575 feet. Humble's Legory 1, Francis Hill Survey, Houston County, was drilling at 3090 feet and operations have been started on the company's projected Travis Peak test near the Kemp Townsite, Kaufman County, on the Lon Hales 148-acre lease.

Kansas Plant Planned

Deerfield Petroleum, Inc., will establish a gasoline plant 5 miles east of Larkin, Kansas, during the summer. Deerfield, a recently-organized corporation with main offices in Wichita, has purchased the gasoline plant of the Northern Natural Gas Company at Hugoton, Kansas, and will rebuilt it. Organizers of the company include F. Connor Creigh, president, and Ed S. Newton, serving as vice president and general manager.

☆ East Texas Border

Huxley Area Test Below 7000; Stanolind Plans Carthage Well

Huxley area wildcat below 7000 feet; Stanolind to drill Carthage well; Rudco's Carthage northwest flank test completed as oiler; block of acreage near Marshall reported dropped.

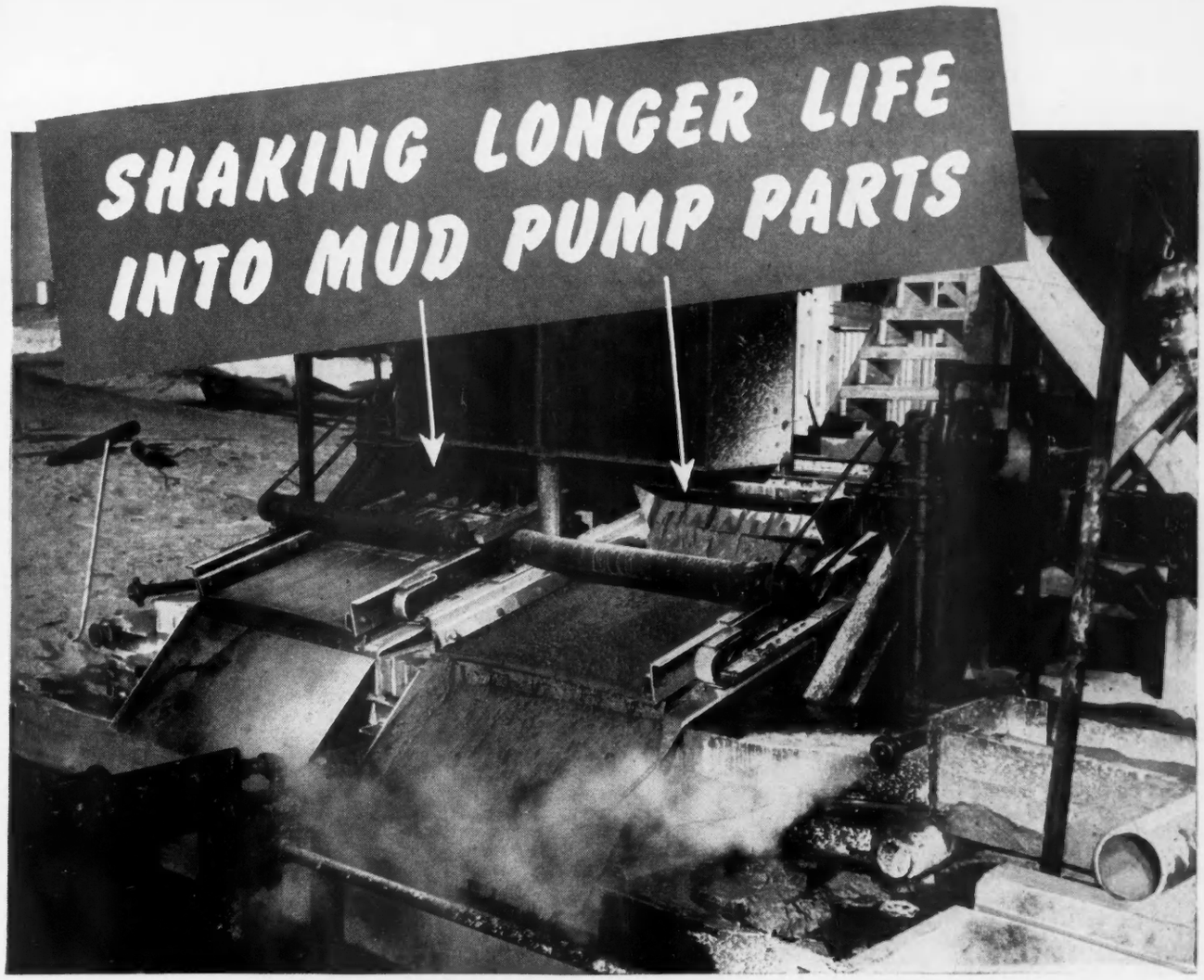
Shelby County: Humble Oil & Refining Company's Pickering Lumber Company 2, Woodfin Survey, Huxley area, drilled below 7000 feet with no tests so far. The well picked up 6 feet of lime and shale at 6670 feet with gas odor and a later core at 6682-99 feet produced shale and lime without production possibilities.

Panola County: Stanolind Oil & Gas Company has filed application for permit to drill a well on the Burnett Brothers lease, John Cheaires Survey, 8 miles northeast of Carthage townsite. The well is to be drilled to 6500 feet.

The Fite Unit of Union Producing Company is still waiting on gauge after dual completion in the Upper and Lower Pettit. Same operator's Mangham 1 in the Carthage field was reported completed in the 2 Pettit zones and has been washed in. Production depth was not reported but total depth is 6490 feet.

Rudco Oil & Gas Company's Hicks 1, McFadin Survey, on the northwest flank of the Carthage field, had its final completion, showing 33.35 barrels of high-gravity oil daily through ¼-inch tubing choke from the 6500-foot level. The gas-oil ratio was 8105/1 with production from Travis Peak. The Hicks 1 also made a gasser from the Pettit horizon, being rated good for 22½ million cubic feet of gas daily.

Harrison County: Rogers Lacy is reported to have abandoned his block of leases 3 miles west of Marshall in the E. Talley Survey. A Travis Peak failure in this area was drilled in 1945 to 7000 feet without production show.



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☆ Southwest Texas

New Producing Area Opened for Southland Field, Duval County

New producing sector in Southland field area opened; McMullen County wildcat being rigged up for pump; wildcat northeast of Sun field has good oil flow.

Duval County: Hiawatha Oil & Gas Company's Southland Life Insurance Company 41 is opening a new producing sector in the Southland field area. The test is 466 feet from the north line and 2300 feet from the east line of Sect. 17, Ball Ranch Subdivision, Agua Poquita Grant. A good recovery of oil from the Cole sand at a level higher than previous production in this field was made. A drill-stem test at 3874-78 feet recovered a little condensate with 700 pounds working pressure in 7 minutes. Another at 3887-91 feet, through ¼-inch choke, developed 5 pounds working pressure in 30 minutes and recovered 50 feet of oil-cut mud. Several other tests were made in the hole, all with favorable shows. Operator is coring for the Teddlie sand.

McMullen County: Dee Davenport's Dolph et al 6-A, wildcat 660 feet west of the 3-A dry hole and eight miles southwest of Ezzell field, is rigging up pump for completion. Total depth is 1390 feet with 5½-inch pipe set to 1379 feet.

Starr County: Sun Oil Company's Green 1, wildcat 2 miles northeast of the Sun field, flowed 16.75 barrels of 48-gravity oil in 5 hours for completion. Total depth is 9895 feet with perforations at 4729-30 feet.

Haynes Stock Sold

Meadows Oil Corporation, a new firm headed by Al H. Meadows, president of General American Oil Company, Dallas, has acquired the capital stock of the Haynes Oil Corporation, Shreveport, for $1½ million.

The latter held three leases, aggregating 135 acres with 37 wells, in the Joiner section of the East Texas field, and two gas-distillate wells in the Blanchard field. Haynes finished drilling its East Texas field leases in 1937.

☆ South Central Texas

Production Try Scheduled for Charlotte Vicinity Wildcat

Production casing set in wildcat southwest of Charlotte townsite; Humble abandons Charlotte field well while testing another on southwest flank of field; first Reklaw sand production for South Texas gauged; new test south of Henry 1 dry hole in Frio County started.

Atascosa County: The Texas Company has set production casing in the Love 1, wildcat a mile southwest of Charlotte townsite, and will make production try. On drill-stem test at 5183-95 feet it recovered 30 feet of oil-cut mud, with no working pressure, tool being open 30 minutes. A second drill-stem test at 5195-5220 feet recovered 30 feet of oil-cut mud with 4 pounds working pressure in 30 minutes. Total depth is 5355 feet.

Humble Oil & Refining Company has abandoned Pruitt 1-B, east outpost in the Charlotte field. Drilled to total depth of 7093 feet, salt water was recovered in a drill-stem test at 7030-37 feet and other tests up the hole at 5178-5251 and 5667-87 feet tested dry with no shows.

Humble's Clement 1, 3400 feet southsoutheast of the Pound 1 and 3600 feet southwest of the Johnson 1, on the southwest flank of Charlotte field, swabbed in and was flowing by heads. Total depth is 5210 feet with 5½-inch casing set to total depth. Drill-stem tests at 5080-5100 and 5100-20 feet recovered oil-cut mud and tests at 5028-45, 5045-60 and 5060-80 feet recovered oil and gas cut mud.

H. R. Smith & Skinner & Eddy Corporation's Wiegang 1, first Reklaw sand oil discovery well in South Texas, gauged potential of 170 barrels of 24.5-gravity oil daily through 5/32-inch choke with 250 pounds tubing and 350 pounds casing pressure and gas-oil ratio of 140/1. This wildcat lies 3¼ miles northwest of Fashing in A. S. Donovan Survey A-194. Flow is from perforations at 3771-77 feet in a sand topped at 3758 feet and showing oil all the way. Total depth is 3781 feet.

Frio County: George W. Strake & Warren Petroleum Company & Wiegand Brothers are preparing to skid rig for a new test on the Grace Cowden Henry tract, about 800 feet south of the Henry 1 dry hole, and about 3 miles northeast of Friotown. The Henry 1, located 3750 feet from the northwest line and 5250 feet from the northeast line of Petra de la Pena Survey 153, A-539, was abandoned at 3669 feet in the Edwards lime topped at 3590 feet.

☆ Lower Texas Coast

South Tulsita-Wilcox Field East Outpost Gets Potential

East outpost in South Tulsita-Wilcox field given potential; Beeville area wildcat cores sand with oil odor; Sun test southeast of Falfurrias sets 5-inch liner; Tynan area wildcat has gas flow.

Bee County: Union Production Company's Ray 64, east outpost in the South Tulsita-Wilcox field, gauged on potential 162 barrels of 33-gravity oil daily through 5/32-inch choke with 625 pounds tubing pressure and gas-oil ratio 600/1. Production is from perforations at 7065-70 feet and total depth is 7075 feet. This test has extended oil production in the field more than ½ mile east.

W. C. McBride In's State 1, wildcat 4½ miles northeast of Beeville, cored a sand with oil odor at 3450-54 feet and on drill-stem test at this level developed 375 pounds working pressure in 4 minutes and recovered 30 feet of oil-cut mud. Another drill-stem test at 3452-57 feet recovered 2200 feet of oil-cut salt water and 10 pounds working pressure in 30 minutes. Operator cored ahead after making these tests. This well lies in the east corner of the 298.2-acre Texas A. & M. College tract and about 1300 feet north of McBride's Connally 3 dry hole.

Brooks County: Sun Oil Company's Sullivan 6 4½ miles southeast of Falfurrias and 660 feet north of Olmes Creek, set 5-inch liner to 12,180 feet after running electrical log to total depth of 13,206 feet. Casing was perforated at 11,987-12,018 feet but so far no recovery has been made. Additional tests are contemplated at the same level.

San Patricio County: Southern Minerals Corporation's Beasley 1, discovery 1½ miles southwest of Tynan, has been completed as a gas well with no gauge reported. Casing was perforated at 4900-08 feet and flowed gas on 9/64-inch choke and was shut in with pressure 1680 pounds. Initial test at 4902-12 feet flowed gas and salt water on 7/64-inch choke and was squeezed off.

☆ Upper Texas Coast

Lake View Test Sets Casing; Liverpool Prospect Has Shows

Wildcat in Lake View vicinity sets casing; Liverpool area test drilling below 12,035 feet with several shows reported; Olive field operations under way; Orange Hill wildcat abandoned; Gilbert Ranch confirmation test has good gas and condensate flow.

Wharton County: Lakeview Oil Company's J. E. J. Johnston 1, wildcat south of the Lake View gas field in I&GN Survey, Sect. 22, Abstract 240, has set 5½-inch casing to 4700 feet. On initial test from perforations at 4520-25 feet, the well flowed oil and some salt water. Perforations have been squeezed and an attempt will be made to shut off the water flow.

Brazoria County: Pan American Production Company's Callihan Unit 1, wildcat 1½ miles southeast of Liverpool townsite, was drilling in hard shale at 12,035 feet. Protective pipe has been set to 11,615 feet to guard several sands with gas and oil shows, and it is reported the well has several other sands below this depth. This wildcat is located several miles west of Chocolate Bayou production.

Hardin County: Pan American Production Company's Sternenberg Lumber Company 1-B, test in the Olive field 7073 feet north and 900 feet west of the Sternenberg 2 confirmation oiler, was coring below 9885 feet for the top of the Wilcox sands at last report. The test is scheduled to 12,000 feet. Same operator's Sternenberg Lumber Company 3, 3000 feet west and 400 feet south of the Sternenberg 1 discovery well, is below 8204 feet.

Austin County: The Ohio Oil Company's Orange Hill Unit 1-B, wildcat 10,500 feet southeast of the Keachele 1 discovery well for the Orange Hill field, has been abandoned as a dry hole at total depth of 9748 feet. One test was made at 9325-31 feet, showing gas with 2600 pounds working pressure.

Jefferson County: Sun Oil Company's confirmation test in the Gilbert Ranch discovery area had a calculated open flow of 105 million cubic feet of gas daily along with considerable amount of condensate. This is the Gilbert Est. 2, 8400 feet south and slightly east of the No. 1 discovery well, in Sara Miles Survey. On ¼-inch choke the well flowed 3,248,000 cubic feet of gas with 80 barrels of 53-condensate daily, having a gas-oil ratio of 40,500/1. Total depth is 9300 feet with production from perforations at 8737-42 feet.

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☆ South Louisiana

Bayou Mallet East Outpost Has Condensate from New Pay

Bayou Mallet east outpost flows condensate from new pay horizon; Production pipe set in Napoleonville dome north flank test; Pan Am's Port Barre test below 9021 feet; Tide Water adds 32,000 acres to Lafourche shooting block.

Acadia Parish: Union Sulphur Company's Sattler 1, eastern side of production at Bayou Mallet, has been brought in as a gas and condensate producer from a new pay horizon. Total depth is 8902 feet with 5½-inch pipe set to 8805 feet. On initial test from perforations at 8220-22 feet the well had salt water with slight show of oil and 2500 pounds bottom hole pressure. Production is from perforations at 8465-67 feet. Flow on initial gauge was 25 barrels of 58.2-condensate daily with 2½ million cubic feet of gas through 10/64-inch choke.

Assumption Parish: Humble Oil & Refining Company's Kessler-Sternfels 1, north flank test on the Napoleonville dome, and an offset to Shell Oil Company's Triche new sand discovery on the north flank, set 5½-inch production pipe at 9143 feet with total depth of 9370 feet in sidetracked hole.

St. Landry Parish: Pan American Production Company's Garland 18, deep test at Port Barre in 4-6s-5e, drilled below 9021 feet after coring from 8872-8916 feet. Small sand streaks recovered in cores from 8908-16 feet showed a slight amount of gas. On drill-stem test a deep sand at 8268-90 feet developed 10 pounds top pressure, and recovery was 200 feet of 33-gravity oil and 400 feet of oil-cut mud.

Lafourche Parish: Tide Water Associated Oil Company has added approximately 32,000 acres to its shooting block in the extreme southeastern portion of the parish. The block was added to acreage already acquired from the Grandison Company, which is north of the old Grandison prospect. The newly acquired block begins southeast of the Golen Meadow field and extends southeasterly to the Grandison prospect.

Emergency Rules to Govern Heidelberg Production Asked

Gulf Refining Company has asked for emergency rules to regulate production in the Heidelberg field of Jasper County, Mississippi, and has also made application for a hearing to determine well spacing and production of oil and gas in the Gwinville field of Jeff Davis County.

In its application for Gwinville regulations Gulf pointed out that two commercial gas lines are being extended into the field for the purpose of marketing gas and rules must be laid down in order to maintain the orderly development of the field and the production of oil and gas therein, and so that waste may be prevented. It is understood that six other companies have also made application to regulate production in Gwinville. They are Mid States Oil Corporation, Sun Oil Company, The Superior Oil Company, Humble Oil & Refining Company and Magnolia Petroleum Company.

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☆ North Louisiana

Zwolle Area Test Is Failure; Longwood Wildcat Below 5565

Zwolle area wildcat abandoned; Longwood area wildcat below 5565 feet; Phillips' De Soto Parish test sets pipe; Plain Dealing area test to go to Smackover lime; 2 wells in South Big Creek field abandoned; new wildcat in Richland Parish drills below surface string.

Sabine Parish: Union Producing Company's Long Leaf Lumber Company 1, wildcat in the Zwolle area, 29-8-11w, has been abandoned at 11,265 feet. Several production tests were run, the last perforations being at 3840-90 feet, followed by acidization and no show of gas or oil.

Caddo Parish: Phillips Petroleum Company's Cush 1, wildcat in the Longwood area, 19-19-16w, was drilling at 5565 feet. Same operator's Waskom 2 in 30-19-16w was drilling at 5596 feet.

DeSoto Parish: Phillips' Nabors 1, wildcat in 28-12-14w, recently taken over from Kerr and McGee Oil Company, has had production string of 5½-inch pipe set to 6675 feet, total depth. Production tests will be made after cement has set.

Bossier Parish: Barnsdall Oil Company's Carter Burton 1, wildcat in the Plain Dealing area in 26-23-13w, drilled to 11,518 feet in the Cotton Valley and will be deepened to Smackover lime. Same operator's Benton Field Unit 13 was drilling at 8205 feet and considered practically completed. Only 5 or 6 feet of good sand was found in the Bodcaw when cored, but a good well in the D sand was expected.

Franklin Parish: Stanolind Oil & Gas Company's Jane Lord 1, South Big Creek field in 20-16-8e, has been abandoned at total depth of 4337 feet. In the same field T. T. Sellars and J. G. Joseph Company's Clark 2, in 2-16-7e, has been abandoned at 3422 feet.

Richland Parish: Pres Cochrane's Dr. T. M. Sayre 1, wildcat in 34-17-7e, set surface pipe of 10¾-inch at 400 feet and drilled to test the Rodessa formation.

Lease Sale Set

A lease sale of restricted lands of the Five Civilized Tribes will be held in the office of A. M. Landman, superintendent, in Muskogee, Okla., August 13. Bids will be received until 10 a.m. on the 81 tracts offered.

☆ Arkansas

Wesson Well Is Put on Pump; Union County Test Has Show

Wesson field well goes on pump; Union County wildcat has small show of oil; Fouke field well waiting on cable tools; Drew County test shows salt water on drill-stem test.

Ouachita County: McAlester Fuel Oil Company's R. B. Allen A-3 in SE SW NE 24-15-19, completed a few weeks ago at 2486-92 feet as the first Tokyo well for the Wesson field, went on pump and is yielding an estimated 16 barrels of oil daily.

Union County: H. E. Wasson's Union Saw Mill Company A-1, wildcat in 8-18-

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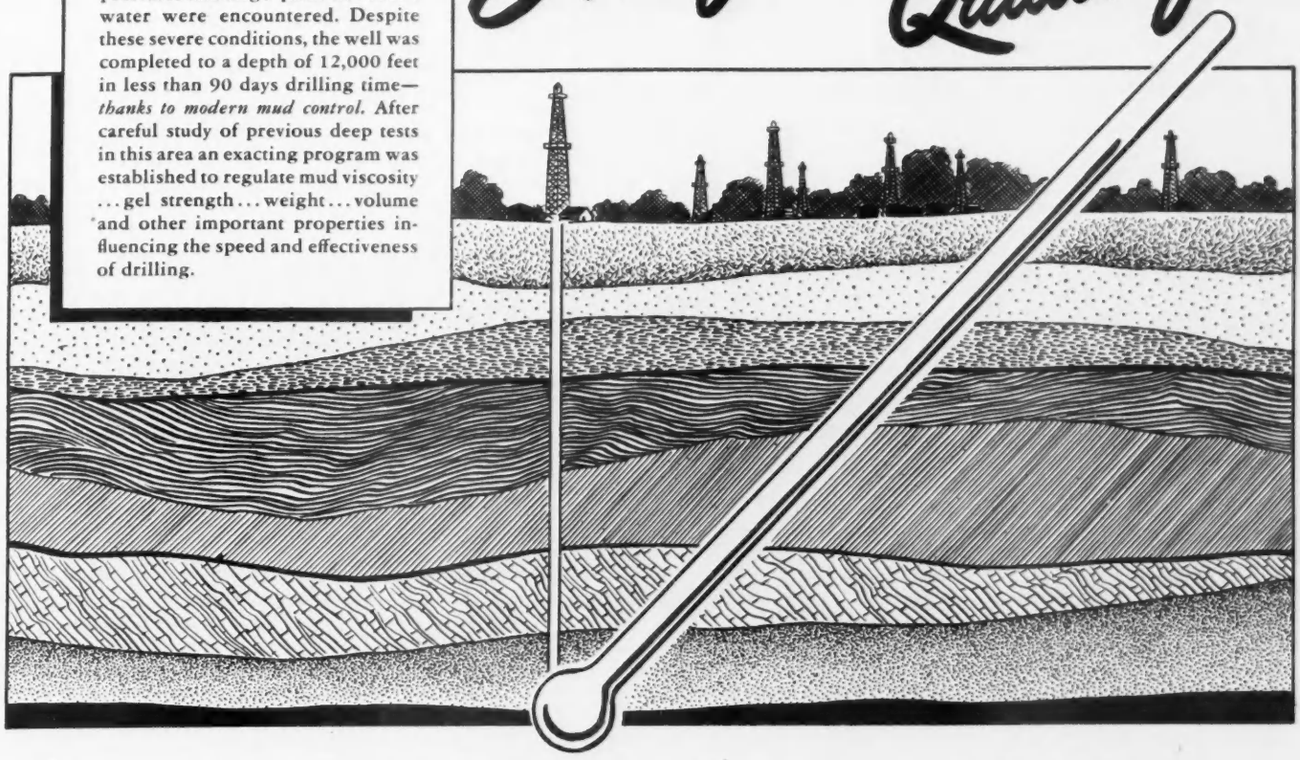

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12, is reported to have had a show of oil. From perforations at 2306-10 and 2316-18 feet it pumped periodically into pits at the rate of 2 barrels of oil daily. Guy Mabee's Union Saw Mill Company 1, wildcat in 31-18-11, drilled below 4371 feet.

Miller County: The Carter Oil Company's Irene Offenhauser 1, in NW NW 5-17-26, Fouke field, is shut down and at latest report was waiting on cable tools. Same operator's Allen Winham 1 in NW SE 3-16-28, Texarkana field, was drilling at 6000 feet.

Drew County: C. A. Kinnard's McCauley 1, wildcat in 14-12-6, showed salt water on drill stem test at 1980-85 feet and was shut in. Same operator's Reinhart 1 in 22-13-6, also a wildcat, was shut down at 2900 feet waiting on pump repairs.

Columbia County: Blain Dunbar's Reed and Biddle 2, NW NE 34-19-20, on the Arkansas side of the East Haynesville field, showed 79 barrels of oil through ¼-inch choke daily, with production coming from perforations at 5605-28 feet.

Texas Pacific Office Closed

Due to the closing of the North Louisiana office, in Shreveport, of the Texas Pacific Coal & Oil Company, the North Louisiana and Southern Arkansas areas will be supervised by the Jaskson, Miss., office of the company. J. B. Kennedy is head of the land and geological department there. Charles McCall, who was located in the Shreveport office, is being transferred to the geological department in Jackson.

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☆ Mississippi

Wildcat Activity Stepped Up; Wayne County Has New Tests

Wildcat activity revives; three prospects getting under way in Wayne County.

Claiborne County: Sun Oil Company's W. R. Hammett 3, 15-11n-1e, only operation in the revived Bruinsburg field, is drilling below 2800 feet after recovering slight odor of sulphur in sand from core sections between 2718-28 feet. Cores from 2656-61 feet revealed sand with good porosity and slight shows of gas.

Adams County: One oiler and 2 failures were recorded for the Cranfield field. The California Company's Geo. W. Armstrong 3, 25-7n-1w, and Ella G. Lees 18, 87-7n-1w, were abandoned in the Wilcox sand zone after no shows with commercial possibilities were recovered. California's Ella G. Lees 17, 29-7n-1w, was successfully completed in the Massive sand with an initial flow of 300 barrels of 38.8-gravity oil from 252 perforations at 10,256-298 feet.

Roeser & Pendleton-Sohio Petroleum Company's W. J. Maier 1, 34-6n-2w, second test in the LaGrange field and located east of the discovery well, has been abandoned at 6240 feet. Slight shows of oil and gas were noted in tests of the Wilcox zone.

Clarke County: J. H. White Trustee's M. Eddins 1, NW NW 19-2n-14e, wildcat east of Langsdale, is working below 3656 feet with no shows. In the Langsdale field, Kirby Petroleum Company's Long Bell Petroleum Company F-3, SE SE NE 30-1n-18e, was preparing to make a production test after running casing to 3761 feet.

Wayne County: In a renewed session of activity 2 permits have been taken out for 2 tests and 1 is preparing to spud. Humble Oil & Refining Company's E. L. West 1, NE SE 18-9n-7w, will get under way shortly for a test of the Eutaw zone at 5000 feet. I. P. Larue has derrick up and is moving in rig for Robinson Lumber Company 1, NE NW 20-6n-6w, and has made location for W. R. Barnhill 1, to be in 21-8n-9w. Both are 5000-foot tests.

Lamar County: Gulf Refining Company's W. J. Howard 2, 17-1n-16w, Baxterville field, was preparing to set production string after reaching 8820 feet in the Massive sand zone.

Lincoln County: Roeser & Pendleton's Columbus Lumber Company 1, NE NW 20-6n-6e, wildcat, is drilling below 8700 feet with no shows. California's Mary Parnell-McDaniel 1, NEc SE 17-6n-8e, is drilling below 9780 feet in the Tuscaloosa zone with no shows reported.

Sharkey County: Maner Graham's Carpenter & Graft 1, SE NE SE 25-13n-7w, wildcat, is drilling below 2500 in shale with no shows. In the Cary field J. H. Gwin's Rice 1, SW SW SW 14-11n-7w, is bottomed temporarily at 3208 feet in effort to recover stuck drill stem.

Jeff Davis County: Gulf's Maggie L. Thompson 1, SEc NE SW 14-9n-19w, Gwinville field, was preparing to complete after well had successful production test from the Eutaw. Three sections of the zone were perforated between 7875-8046 feet and in a 4-hour test the well flowed at the rate of 38 barrels of 53.2-gravity condensate and

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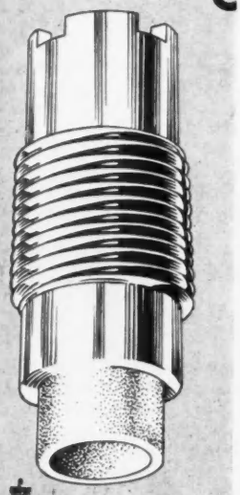

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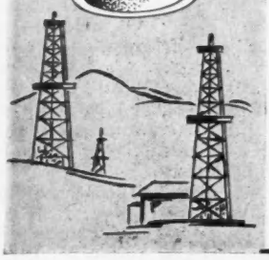

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Perry County: Two wildcat locations are expected to be staked shortly on the Richton Moselle salt ridge. Reports indicate that Gulf Oil Corporation will make location soon for a test in 28-6n-11w to test the Ovett prospect. Humble Oil & Refining Company is credited with having programmed a test for the Northwest Richton prospect in 14-5n-11w.

Kansas Allowable Hearing Set

Kansas State Corporation Commission has set July 26 as the date for considering market demands and to fix the state and pool allowables for August. Hearing is scheduled for 10 a.m. in Wichita.

☆ Alabama

Pickens Wildcat to Get Test; Casing Set in Winston Well

Pickens County wildcat has slight odor at 1937 feet; Walker County test in Trenton; production casing set in Winston County well; Gilbertown field test below 2734 feet.

Pickens County: C. H. Murphy Jr.'s R. E. Eaton 1, NE SE 34-19s-16w, a shallow wildcat, had slight odor in cores at 1937-45 feet and is preparing to run a drill-stem test. The well was drilling in black shale. Top of the Paleozoic has been called at 970 feet.

Walker County: Glen D. Rose Oil & Gas Company's First National Bank of Birmingham 2, NW SE 30-12s-7w, is drilling below 2831 feet in the Trenton. Some tops by samples are Bangor lime, 995 feet; Hartselle sand, 1440 feet with slight oil show at 1445-50 and 1455-65 feet; Galena, 1600 feet; and Tuscumbia, 1733 feet with show of gas.

Winston County: Glen D. Rose Oil & Gas Company's First National Bank of Birmingham 3, SWc SE 7-12s-8w, has set 7-inch casing to 1810 feet and is waiting on cement. The well had a show of gas at 1384-94 feet, a show of asphaltic oil at 1475 feet, and a show of live oil at 1485-90 feet in the Hartselle. Total depth is 1985 feet in the Tuscumbia lime topped at 1850 feet.

Choctaw County: The Carter Oil Company's E. A. Rentz 1, NE NW NE 4-10n-3w, in the eastern section of Gilbertown field, is below 2734 feet with no shows reported.

Florida

Humble Oil & Refining Company's Gulf Coast Realty Company 8, SW SE 19-48s-30e, Sunniland field, Collier County, is drilling below 8710 feet in anhydrite with no shows.

Walton County: R. D. Logan, Trustee's Walton Land & Timber Company 1, SW SW 14-1n-18w, wildcat, has been abandoned in the Comanchean zone at 6500 feet. Slight gas odors were encountered in cores in Austin chalk sections below 3792 feet and oil odor at 4056-76 feet but no commercial potentialities were indicated.

Hillsborough County: Humble's T. S. Jameson 1, NE NE 7-31s-22e, wildcat in the southeastern section of the state, has been abandoned without commercial shows at a total depth of 10,125 feet.

Monroe County: Gulf Refining Company's State 1, SWc 2-67s-29e, wildcat, is drilling below 9807 feet in lime with streaks of dolomite with no shows reported.

Osceola County: Humble's N. Ray Carroll 1, SE SE 10-27s-34e, wildcat, is drilling below 7933 feet. No shows have been indicated.

☆ Rocky Mountain Area

Pure's Wildcat in Eastern Colorado Nears Abandonment

Pure's Eastern Colorado wildcat nears abandonment; Carter may abandon wildcat in Converse County, Wyoming; Pure has 2 near completions at River Dome; activity stepped up in Glacier County, Montana.

Colorado

The Pure Oil Company's Eastern Colorado wildcat at Eads is nearing abandonment at 5755 feet. The well is Union Pacific 1, C SE SE 17-17s-48w, Kiowa County, and has been reported below the Arbuckle at its present depth. Pure has cored some saturation in depths below 4000 feet.

Wyoming

In the Shawnee area, The Carter Oil Company's Unit 1, C SW NW 19-33n-68w, Converse County, is shut down and may be abandoned at 11,763 feet. This test topped Muddy sand at 11,375, Dakota 11,450 and Lakota 11,650, but no shows were reported in any section. This is the deepest test made in the

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south end of the Powder River Basin, which has such commercially productive fields as Salt Creek and Lance Creek.

Washakie County: At River Dome, Pure has 2 near completions. Unit 2, NE NE NW 12-58n-92½w, is testing in the Embar section between 10,272-360 feet, total depth. The well is a mile northwest of the discovery completed in the same zone for 30 barrels of oil with 250,000 cubic feet of gas per day. Unit 3, NE SW SW 17-48n-92w, is making drill-stem tests of the Frontier section between 7140-7531 feet, total depth. This formation showed gas in the other 2 wells but no tests were made.

The Neiber Dome wildcat of G & G Drilling Company should soon have Sundance sand. The well, Unit 1, SE NE NW 19-45n-92w, is drilling below 8500 feet and logged Dakota at 8350. This well is 18 miles south of the Pure discovery at River Dome.

Montana

Following the Madison lime discovery of Carter at Brindley 1 on the north end of the Cut Bank field, there has been increased activity in that area of Glacier County. At present there are 6 wells drilling in this new section and Carter is completing Brindley 2, C NW NW 12-36n-6w, swabbing and flowing 252 barrels of oil in 24 hours after acidizing. Union Oil Company's Stufft 2, C SW NW 19-36n-5w, is also a near completion, swabbing 5 barrels of oil per hour between 3100-06 feet.

☆Canada

Imperial Test to Follow Up Good Showing in Viking Sand

Imperial Oil Ltd. has started a test to follow up the promising showing of 30-32-gravity crude found 2 months ago in the Viking sand at the company's Kinsella 14. The new venture, Imperial-Kinsella 19, is ¼ mile north of No. 14 in lsd 10 28-45-9w4. The No. 14 was recently abandoned when, in setting casing, cement sealed off bulk of the oil-bearing sand but failed to seal off the overlying water and gas-bearing section. Total depth was 2048 feet. The oil showing was the first of importance found in the Viking sand, source of natural gas in the ¼-million-acre Viking-Kinsella gas reserve of the Central Alberta Plains.

The South Princess Syndicate (made up of Standard Oil Company of California and 7 independent concerns) has started its second venture, a Devonian test, in lsd 4 4-19-11w4, about 6 miles southeast of the Empire-Pacific 1 and 2 Chert-Madison oil wells and around 12 miles south and east of California-Standard's Devonian oil wells. The syndicate's initial venture has been abandoned at 3457 feet after failing to obtain commercial production in the Sunburst, Chert or Madison. The No. 1 was drilled 1½ miles northwest of the Empire-Pacific producers.

Imperial Oil Ltd. has started its third well in the Duvernay area, on the northerly Central Alberta Plains, following up 2 wells which obtained encouragement but not commercial production, in Lower Cretaceous and Devonian lime. The new test, Imperial-Duvernay 4, is going in lsd 6 33-56-11w4, some 7 miles north of the Duvernay 1.

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CALIFORNIA WILDCATS

Kern County—Failures: L. S. Gilmour & Associates' McKendree 37, 11-30s-28e, North Mountain View area, Transition Zone 4690 ft., Wharton 4725, abnd 4810.

Gene Reid Drilling Co.'s Lorraine 1, 2-28s-27e, Kern Front area, abnd 5875.

Los Angeles County—Failure: Ohio's Gardena Community Four 1, 23-3s-14w, Gardena area, abnd 10,288.

COLORADO WILDCAT

Rio Blanco County—Gas Discovery: General Petroleum's Gov't. 84, se se ne 15-2s-96w, Piceance Creek, elev 7617, Wasatch 3013, Base Tertiary 9350, 12,019 td, pb 3184, flowed 4½ million cubic ft gas daily, 330 lbs. CP flowing.

FLORIDA WILDCATS

Hillsborough County—Failure: Humble's T. S. Jameson 1, ne ne 7-31s-22e, abnd 10,125.

Walton County—Failure: R. D. Logan's Walton Land & Timber Co. 1, sw sw 14-1n-18w, Austin 3790, Eutaw 4078, Massive sd 4880, abnd 6500.

ILLINOIS WILDCATS

Clinton County—Failure: Texas' Peltes 1, sw sw ne 16-1n-4w, abnd 1243.

Coles County—Failures: Victor M. Scheaf's Lawson 1, ne ne nw 27-11n-7e, abnd 2058.

Y. E. Hildreth et al's Roberts 1, ne ne sw 9-13n-14w, abnd 500.

Effingham County—Failures: J. Lichlyter et al's Wendt 1, ne ne ne 16-6n-7e, abnd 2890.

J. Lichlyter's Wheeler 1, ne se nw 16-6n-7e, abnd 3003.

Jefferson County—Failures: Ashland's Barnett 1, se se nw 17-1s-4e, abnd 410.

Ashland et al's Brookman Heirs 1, se ne nw 17-1s-4e, abnd 2863.

Marion County—Failures: Texas' Wooters 1, ne nw se 21-1n-2e, abnd 2261.

Ben J. Taylor's Brewer 1, ne se se 26-3n-2e, abnd 2380.

Wabash County—Failure: Hayes' Fischer 1, sw ne nw 7-1s-13w, abnd 2849.

Washington County—Failures: Ideal Drilling's Pasczkiewicz 1, se sw nw 9-3s-2w, abnd 1477.

Ben Taylor et al's Bauza 1, sw se sw 6-3s-1w, abnd 1477.

Wayne County—Failure: Ryan Oil's Matchett 1, nw nw se 19-1n-6e, abnd 3207.

Wayne County—Oil Discovery: Deep Rock's Ulysses 1, ne nw nw 30-1n-6e, pump 71 bbls fr McClosky at 3151, td 3178.

White County—Oil Discovery: S. A. Gilpin's Bayley 2, sw sw ne 3-7s-9e, pump 150 bbls fr Rosiclare at 3005, td 3012.

INDIANA WILDCATS

Porter County—Failure: Lee & Steinhaus' Holgren 1, 31-36n-5w, abnd 444.

KANSAS WILDCATS

Barton County—Failure: Potash Company of America's Weber 1, ne se nw 35-19s-14w, abnd 3536.

Marion County—Failure: S. A. Yarnell's Waner 1, sw sw ne 14-20s-4e, abnd 2630.

KENTUCKY WILDCATS

Daviess County—Failure: Martin Laly et al's Brooks 1, 6-N-29, abnd 1777.

Henderson County—Failure: H. C. Neely and Frank Zogg's Cosby-Inglehart 1, 6-O-26, abnd 632.

Union County—Failure: Sun Oil Co.'s Willett-Byrnes 1, 2-O-21, abnd 2702.

SOUTH LOUISIANA WILDCATS

Acadia Parish — Failure: Union Sulphur's Arceneaux Est 1, 660 ft s&e of nwc sec 33-8s-3e, abnd 11,252.

Avoyelles Parish — Failure: Avoyelles Pet Corp.'s Bordelon 1, fr nec sec 56, 2370 ft s 77 deg 45 min w alg sec line, th 1300 ft sly at RA to locn in sec 56-2n-4e, abnd 9017.

Calcasieu Parish—Failure: Sohio's Farmers Land & Canal Co. Inc. 1, 2118.8 ft n & 663.2 w of WEc sec 27-10s-7w, abnd 10,618.

NORTH LOUISIANA WILDCAT

Sabine Parish—Failure: Union Prod. Co.'s La. Long Leaf Lbr. Co. 1, c sw sw 29-8n-11w, Chalk 2246, base Austin 3724, L. Cretaceous 3850, Massive anhy 5893, Rodessa 6043, Travis Peak 7796, Cotton Valley 10,580, abnd 11,265, pb 3888.

MISSISSIPPI WILDCATS

Leake County—Failure: Donald M. Reese's C. H. Denson 1, 29-9n-6e, Wilcox 1133 ft, Eutaw 4998, Tuscaloosa 5433, abnd 5476.

OKLAHOMA WILDCATS

Bryan County — Failure: Tom B. Owens' Hauk 1, cse se 25-7s-11e, abnd 2910.

Comanche County—Failure: Beck & Johnston's Storer 1, se ne ne 10-1n-10w, abnd 1495.

Garvin County—Failures: British-American's Guthrie 1, nw nw se 7-3n-2w, abnd 7452.

Mid-Continent's Davenport 1, ne ne nw 28-4n-2w, abnd 6838.

Lincoln County—Discovery: Fred Morgan's Cash 1, ne ne sw 6-14n-4e, flowed 5.7 bbls. oil per hour from Oswego, 3910-58 ft, td 4345.

Okfuskee County—Failure: George Martin's Metro Trust 1, se sw sw 15-12n-10e, abnd 3035.

Woods County—Failure: Champlin Refining's Scribner 1, se sw ne 14-28n-19w, abnd 7513.

OHIO WILDCAT

Muskingum County—Failure: Wittmer Company's Clarence A. Klein 1, ne nw 11, Adams Township, Clinton 4218-4259 ft, abnd 4359.

WEST TEXAS WILDCATS

Andrews County—Failures: Skelly's University 1-A, c sw se sec 3, blk 11, elev 3325 ft, anhydrite 1550, Yates 2810, San Andres 4270, Wichita-Albany 6765, abnd 7883.

Shell's University 1-B, c ne se sec 10, blk 11, elev 3326 ft, Yates 2810, San Andres 4270, San Angelo 5400, abnd 6875.

Terry County—Failure: J. D. Hunter et al's Pool-Seaboard 1, se se se C.&M. 4, blk D-14, elev 3552 ft, anhydrite 2290 ft, San Andres 4300 ft, abnd 5163.

Ward County—Failure: Gaylord H. Chizum et al's University 1, 2313 ft snl and 330 ft wel sect 27, blk 18, elev 2829 ft, anhydrite 802, Rustler 938, salt 1188, Delaware lime 5158, Delaware sand 5192, abnd 5343.

WEST TEXAS OUTPOST FAILURE

Mitchell County—Iatan-East Howard Field Outpost Failure: Willbanks Bros. et al's Jones 1, nw se se T&P Ry. 13, blk 30, T-1-S, abnd 3143.

WEST TEXAS OUTPOST AND DEEP PAY FAILURE

Andrews County—Dollar Hide Field Outpost and Deep Pay Failure: Humble's Cowden et al 1, c ne nw PSL 13, blk A-55, 11/16 mi se of 7960-ft Devonian discovery, elev 3132 ft, base Whitehorse 4420, San Angelo (Glorietta) 5710, Clear Fork 6120, Tubb 6720, Pennsylvanian 8515, Mississippian 9370, Woodford shale 10,200, Devonian 10,570, 2790 ft low to discovery, abnd 10,737.

WEST CENTRAL TEXAS WILDCAT

Jones County—Failure: M. M. Travis et al's Reeves 2, 990 ft snl and 1696 ft ewl of s½ sec 164, BBB&C Ry. sur, elev 1560 ft, abnd 1938.

WEST CENTRAL TEXAS NEW PAY DISCOVERY

Shackelford County—Sedwick Deep Field Intermediate Pay: Phillips-Pan Oil's Hickman-Nellen 1, 660 ft snl and 606 ft wel sec 16, Lunatic Asylum Lands, ¼ mi ne of Ellenburger discovery, elev 1362 ft, Bend 3825, Barnett 4080, Ellenburger 4236, pumped 29 bbls 42.3 gra oil and 2 bbls water initial acidized 500 gals via Marble Falls perf 3934-48 ft, td 4310 ft, pb to 4001 ft.

NORTH TEXAS WILDCATS

Archer County—Failure: Clyde Gibson et al's Wilson-McCrory 1, 330 ft out SWc lot 1, sec 55, ATNCL sur, elev 1026 ft, abnd 4816 ft.

Clay County—Failure: J. P. Owen et al's Adams 1, 2112 ft ewl and 1293 ft snl of 162.9-ac tr, blk 148, Byers subdiv, elev 883 ft, Canyon 2845, Ellenburger 3133, abnd 3217.

Cooke County—Failures: Hood and B. O. M. Oil Co.'s Danyhemer 1, 450 ft ewl and 250 ft nsl of J. C. Morgan sur A-749, abnd 1644.

A. E. Hudspeth et al's Reiter 1, 150 ft snl and on w line lot 7, Geo. M. Casey sur A-198, abnd 1725 ft.

Cottle County—Failure: W. H. Peckham et al's Willie 1, 660 ft out SWc sec 2, A. A. Neff and TWNG Ry. sur, elev 2111 ft, abnd 6007.

Grayson County—Failure: H. W. Snowden O&G Co.'s Bryant 1, 1768 ft s and 1060 ft w of NWc of A. Hilburn sur A-494, but in E. M. Jones sur, 623, elev 782 ft, abnd 4430.

Wichita County—Failure: R. G. Drilling's Kempner 1, 467 ft out NEc labor 32, Lge 1, Denton CSL, elev 1004 ft, Ellenburger 5584 ft, abnd 5708.

Young County—Oil Discovery: A. R. Dillard et al's M. Killian 1, 330 ft snl and 1650 ft wel TE&L Co. sec 211, elev 1212 ft, Bend 4212, Mississippi 4940, flowed 280 bbls natural through 1-in fr Mississippi perf 4944-65, td 9965.

EAST TEXAS WILDCAT

Freestone County—Failure: O. W. Killam's Fee 1, 330 ft snl and 3000 ft wel 272½-ac tr, or 2175 ft e of m/e/w and 1925 ft nsl Antonio Sanchez sur A-553, elev 395, abnd in Woodbine 5225.

SOUTH CENTRAL TEXAS WILDCAT

Bexar County—Failure: John Teagle-E. W. Gill's Randolph Lemelle 1, 330 fr el 1000 fr nl 161.65-ac lse, Alfonso Steele sur 18, 2 mi s Sooksey fld, abnd 2476.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: R. S. Hayes-Newman Bros. Drlg. Co.'s J. F. Welder Heirs 1, 330 fr s&wl 80-ac lse, s½ nw¼ Geo. Bodet sur 70, 1 mi e of N. Loma Novia, abnd 3118.

Magnolia's Duval County Rch. Co. sec 273-1, 660 fr w&sl GC&SFRR sur 273, 480-ac lse, abnd 3015.

LOWER TEXAS COAST WILDCAT

Live Oak County—Failures: Atlantic's Frank P. Morris et al 1, 660 s 660 w of swc J. T. Conn sur, I. M. Alexander sur, Wilcox 7387, gas 8265-75, abnd 10,018.

LOWER TEXAS COAST NEW PAY TEST

Jim Wells County—W. Magnolia City Gas Discovery: Ralph E. Fair's Wm. F. Filter 1, 330 fr nl 330 fr nel 80-ac lse, blk 7, Chas. Seefeld Farm lds, 2350 n ne Reynolds & Richardson 1, disc well, no shows in Frio or Stillwell, pay 3720, perf 3752-53, flow 2,221,000 dry gas, ¼-in, td 5845.

UPPER TEXAS GULF COAST

Harris County—Failure: Jack W. Frazier's R. J. Weis 1, 467 ft fr w&s/l's of W. M. Waters sur A-581, 4½ mi nw Fairbanks prodn, abnd 7816.

WYOMING WILDCAT

Washakie County — Oil Discovery: Pure's Unit 1, ne ne nw 18-48n-92w, River Dome, Embar 9977, td 11,379, pb 10,131, flow 30 bbls 42 fr oil per day with ¼ million cubic feet gas.

CANADA WILDCATS

South Alberta Plains—Pinhorn Failure: McColl-Frontenac & Union of California, 4-10-1-8, lsd 4-10-1-8w4, abnd 3537 in Madison lime; water showing.

South Alberta Plains—Stirling Failure: Imperial Oil Ltd.'s Stirling No. 2, lsd 7 13-7-20w4, abnd 3942 in Madison lime, water showing.

WILDCAT STARTS

CALIFORNIA

Kern County: Atlas Production's U. S. Anticline 1, 33-27s-19e, McDonald Anticline area, lcn.

Tide Water's Tupman 43-9, 9-31s-29e, Arvin area, lcn.

Wilshire Oil's Lehman 4, 18-28s-20e, Belridge area, lcn.

Fresno County: Shell's Kreyenhagen 23-8, 8-22s-16e, Jacalitos area, lcn.

Solano County: Standard's Kirby Community 2, 36-4n-1w, Kirby Hills area, prep to spud.

Los Angeles County: Richfield's U. P. Unit 2, 8-2s-12w, East Los Angeles area, ru.

Union Oil's Simi 7, 22-3n-17w, Simi area, lcn.

Orange County: A. W. Lyddon, Operator's Crew Community 1, 32-5s-10w, Huntington Beach area, building rig.

COLORADO

Jackson County: Wm. L. Farrelly Gov't. 2, nw nw nw 3-11n-81w, Lake Creek, lcn.

ILLINOIS

Clay County: T. Blake Dirickson's Cassidy 1, se sw se 5-2n-7e, drlg.

Coles County: N. A. Cummings' Harrah 1, se se se 27-12n-8e, drlg.

Fayette County: Claude Neon Light, Inc.'s Hassebrock 1, se se nw 23-5n-3e, lcn.

Hamilton County: Olson Drlg's Boyer 1, ne ne sw 29-5s-7e, lcn.

Cumberland County: R. E. Brown's Easton 1, sw se se 24-9n-9e, drlg.

Edwards County: Hudson - America Corp.'s Ahlfeld 1, nw se ne 21-1n-10e, drlg.

Effingham County: J. D. Dunbar's Heitman 1, sw sw sw 27-6n-6e, drlg.

Jefferson County: Collins Brothers' Gaines-Slick et al 1, se se sw 5-3s-1e, lcn.

Thomas J. Hynes' Sloat 1, ne se nw 6-1s-1e, lcn.

Lawrence County: George S. Engle's Buchanan 1, sw sw ne 16-2n-12w, lcn.

Saline County: William P. Ford's McCue 1, ne nw ne 5-9s-7e, drlg.

Marion County: H. Miller's Coursen 1, sw sw sw 5-2n-2e, lcn.

Shelby County: Joe Rezkick et al's Walker 1, ne ne ne 14-10n-3e, lcn.

Washington County: Nat'l Consumers Oil's Pitchfort 1, nw sw se 10-2s-1w, lcn.

Ideal Drlg.'s Paszkiewicz 1, se sw nw 9-3s-2w, drlg.

Ben Taylor et al's Bouza 2, nw se nw 7-3s-1w, drlg.

White County: W. I. Lewis' Bingham et al 1, sw se ne 17-5s-9e, lcn.

Olson Drlg's Renshaw 1, se se se 17-5s-9e, drlg.

INDIANA

Floyd County: John W. Greist's Hite 1, 21-3s-6e, lcn.

Gibson County: Eldon Hayden's Crecelius 2, 5-2s-10w, lcn.

Pike County: E. L. Shoudy's Thomas 1, 8-1n-7w, lcn.

Spencer County: I. C. Huff et al's Forsythe 1, 30-6s-5w, lcn.

KANSAS

Barber County: J. M. Huber et al's Smith 1, nw nw nw 7-32s-11w, lcn.

Barton County: D. R. Lauck's Zorn 1, ne ne ne 1-17s-12w, rur.

C. E. Ash's Moses Estate 1, sw sw nw 35-17s-13w, rur.

Cowley County: J. C. Trigg's Batdorf 1, sw sw nw 14-34s-7e, lcn.

Ellis County: J. C. Farley's Wiesner 1, se se se 26-13s-20w, c&p.

Kiowa County: Phillips' Nora 1, csw nw 26-28s-17w, lcn.

Marion County: Joe Morine's Theis 1, sw sw sw 14-19s-4e, mim.

Pratt County: Stanolind's Hiskett 1, se se nw 23-29s-11w, drlg 984 ft.

Rice County: Iron Drlg. et al's Hoyt 1, se se sw 24-19s-9w, c&p.

Rooks County: Continental's Graham 1, ne ne nw 29-9s-20w, lcn.

Trego County: Republic Natural's Hille 1, sw sw ne 13-15s-24w, lcn.

KENTUCKY

Crittenden County: Kennard's Thurman 1, 11-J-18, drlg.

Henderson County: C. Woods' Reichert Heirs 2, 17-Q-22, drlg.

SOUTH LOUISIANA

Acadia Parish: Wm. Helis & Earl Batema net al's J. L. Carriere 1, 660 ft w 550 ft s of ne c of ne ¼ ne ¼ sect 23-7s-2e, 2 mi nw S. Lewisburg field, 10,400 ft test, lcn.

Evangeline Parish: Magnolia Petroleum Co.'s Reed Est 1, 660 ft s & 660 ft w of NEc of se¼ ne¼ sect 26-5s-1w, 4 mi sw Mamou prodn, 13,500 ft test, lcn.

NORTH LOUISIANA

Bossier Parish: H. C. Cummings' Burkett Est. 1, c nw nw 29-16n-10w, 3500 ft test.

Jackson Parish: W. T. Anson et al's W. R. Guess 1, c se nw 25-16n-3w, 10,000 ft test.

Madison Parish: Arrow Drlg. Co.'s E. J. Waller 1, 200 fr sl 300 fr el 16-17n-11w, Paluxy test.

Richland Parish: Pres Cochrane's Dr. T. M. Sayre 1, c se se sw 34-17n-7e, Paluxy test.

Pan-American Prod. Co.'s Geo. Franklin 1, 2028 fr nl 660 fr el 3-17n-8e, Glenrose test.

MISSISSIPPI

Jefferson County: Humble's J. Fred Gordon B-1, 44-9n-1w, lcn.

Greene County: Humble's W. W. Green 1, se sw 27-2n-6w, lcn.

Wayne County: I. P. Laure's Robinson Lbr. Co. 1, ne nw 20-6n-6w, rig.

I. P. Larue's W. R. Barnhill 1, nw nw 21-8n-9w, lcn.

Yazoo County: Sohio's J. Christopher-Texas Co. 1, 5-11n-2w, drk.

MONTANA

Big Horn County: H. L. Hunt's Kendrick 1, se se 24-1n-34e, Nine Mile area, rur.

Hill County: Midwest Drilling's Fee 1, se sw ne 14-35n-16e, lcn.

OKLAHOMA

Atoka County: A. A. Blonner's Blonner & Pierson 1, nw ne nw 19-3s-11e, drlg.

Comanche County: G. C. English's Goldren 1, sw nw nw 15-1s-13w, lcn.

Cotton County: Featherstone et al's Tunnell 1, nw nw nw 7-4s-10w, drlg.

Kingery Bros.' Ho Mo Vish 1, sw nw nw 1-4s-11w, drlg.

Garvin County: Sohio Oil's Parkey 1, sw nw ne 14-4n-1e, rur.

Lincoln County: Deep Rock et al's Creekmore Community 1, sw sw ne 25-14n-54, mir.

Noble County: Davon Oil's Buffalohead, nw nw nw 7-24n-4e, lcn.

Okfuskee County: W. M. Dunn's Crawley & Morgan 1, nw nw se 36-11n-10e, mir.

Pottawatomie County: James Wise's State 1, ne ne nw 16-10n-5e, lcn.

Seminole County: Charles Nee's Spears 2, sw ne sw 19-6n-8e, lcn.

SOUTH DAKOTA

Fall River County: Woodward Oil's Gov't 1, ne sw sw 4-10s-4e, mim 3000-ft test to Minnelusa.

WEST TEXAS

Andrews County: Humble's H. O. Sims 2, c ne ne PSL 25, blk A-39, lcn for Ellenburger test.

Texas Gulf Producing Co.'s University-Cities Service 1, lse 4, 660 ft wel and 664 ft nsl sect 30, blk 9, mile ne outpost for Emma field, lcn San Andres test.

Ector County: Humble's R. B. Cowden 1-B, c ne ne T&P Ry. 11, blk 45, T-2-N, 1⅞ mi ne outpost to North Goldsmith-Devonian field, lcn for 8500-ft Ellenburger test.

Lubbock County: Bankline Oil Co.'s G. B. Adkisson-Stanolind 1, c sw se E. L. & RR Co. 37, blk C-2, lcn 6000-ft Clear Fork test.

Pecos County: Olson Drlg. Co. et al's E. M. Roots 1, c sw se T&StL Ry. 17, blk 118, lcn for 5000-ft test.

WEST CENTRAL TEXAS

Jones County: T. A. Kirk and Ray Oil Co.'s A. Jobe 1, ne ne ne S.P. Ry 14, blk 2, lcn 2750-ft cable test.

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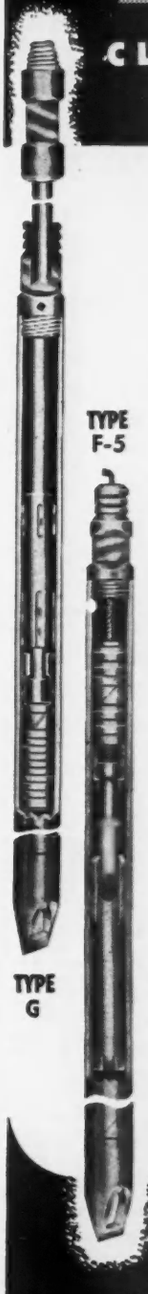

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■ FOR SALE—New Fairbanks-Morse 3 x 4 duplex power pump. B. Edwards, 611 Terminal Building, Oklahoma City, Oklahoma.

■ FOR SALE—Model C Spudder in new condition on rubber, V-belt drive, International 40 hp. gasoline motor, complete with 6, 8 and 10′ tools, jars, bailers and misc. equipment. Phone 3-1156 or P. O. Box 414, Fort Worth, Texas.

■ 5 Complete Reda Pumping Units. Cables like new. 75 and 97 H.P. Motors. Max Steinbuchel, 1905 Park Place, Wichita 4, Kansas. Phone 5-6082.

■ SPECIAL—New, factory rebuilt, and used Guiberson Radial Air-Cooled Diesel Engines, 125 h.p. to 250 h.p. Excellent power for Sawmills, Oil and Water Well Drilling Crushers, Air Compressors, etc. Located Corsicana, Texas, and Pueblo, Colorado. Large stock New Spare Parts. Prices at 5% to 20% of regular list price. Bernstein Brothers, Pueblo, Colorado, or Bernstein Brothers c/o Navarro Hotel, Corsicana, Texas.

■ FOR SALE: Complete power driven Rotary rig with 6700′ of drill pipe. Jack knife derrick that can be used 95′ or 122′. Has lots of extra equipment and small tools. This rig has drilled one 6300′ well. For inventory and price contact Tanner Drilling Company, 300 Ricou-Brewster Bldg., phone 3-8334, Shreveport, Louisiana.

■ FOR SALE: Special shop built portable drilling rig, mounted on 1943 GMC 2½ ton, 6x6 truck, suitable for oil drilling or deep water well to a depth of 3000 feet. All new equipment. One 1942 Chevrolet 1½ ton, 4x4 water truck, with winch. Address: P. O. Box 658, Conroe, Texas. Phone 241.

■ FOR SALE—Three 14″ x 18″ latest type Model 47 Fairbanks-Morse Horizontal twin cylinder Diesel Engines. 250 H.P. @ 300 RPM, 350 H.P. @ 400 RPM. These Engines are in good condition and mounted on steel skids. These are ideally suited for driving electric Generators, central lease pumping units, Gins, Stationary Plants of all descriptions and are very simple and economical to operate. Will sell worth the money. Contact Box 1881 or phone 2412, Midland, Texas.

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50— 500 Barrels
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20— 5,000 Barrels
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Heavy A.P.I. New closed bolted type steel tanks now located at Ogden, Utah. Can quote reasonable prices in order to move from present premises at once.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair County, Ill.

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■ WANTED: Experienced draftsman for employment in Petroleum Engineering Department. Advancement not limited for employee with initiative. Box 39, The Oil Weekly, Houston, Texas.

■ GRADUATE PETROLEUM ENGINEER over 40 years of age. Specialized in study of oil and gas reserves general Mid-Continent region. To head reserve section large independent company. State full particulars in letter. Box 41, c/o Oil Weekly, Houston, Texas.

SEISMOGRAPH INSTRUMENTS

Eight trace seismograph instruments complete with oscillograph, unit amplifiers, electrically driven tuning fork, automatic expander, cable reels and geophone cables. $2500.00. Varo Mfg. Co. Box 686, Garland, Texas, Phone 4085.

SERVICES

■ Manufacturer's agents, with technical experience, desiring additional accounts with drilling contractor contacts to sell oil drilling tools in various areas of Texas, Louisiana, New Mexico, southern Kansas, Oklahoma, references. For details address Box 34, c/o The Oil Weekly, Houston, Texas.

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LEASES, DRILLING, ACREAGE, ETC.

■ Drilling contractor wants acreage proposition or farm-out in Permian Basin. Must have merits. Contractor, Box 1549, Odessa, Texas.

■ ATTENTION OIL MEN—I own several thousand acres of 99 year oil leases which I inherited from my Father, Southern Kentucky, Northern Tennessee. No stipulation as to time of beginning work, without my consent there has been drilled a number of wells which proved to be producing ones. Would like to correspond with parties who are financially able to handle proposition. References exchanged. Address: Mrs. LaVelle Aleander Martin, Post Office Box 1175, Tallahassee, Florida.

WANTED TO BUY

WANTED

48 to 60 inch, 1000 lb. working pressure used Natural Gasoline Absorber for immediate inspection and delivery. Will consider two smaller absorbers. Call or write Van Thompson, Southern Union Gas Company, 1104 Burt Building, Telephone L.D. 837, Dallas, Texas.

SITUATION WANTED

■ SITUATIONS WANTED, FOREIGN. Seismic interpreter with 10 years experience desires position as supervisor, coordinator or interpreter in foreign service. Capable and ambitious; want job with future. Box 46, c/o The Oil Weekly, Houston, Texas.

■ DRILLING AND PRODUCTION SUPT.: Age 44, 27 years experience in drilling and production operations. 22 years supervisory experience in drilling (Rotary and Cable tools), completions, production developments, workover operations and flush and stripper production. References if desired. Address: Box 32, c/o The Oil Weekly, Houston, Texas.

■ Position as production supervisor, with independent operator with betterment possibilities. Graduate engineer, age 39. Eleven years production engineering, major company, shallow and deep production. Also capable handling geological studies, drilling operations and well completions. Presently employed, desire change. Box 48, c/o The Oil Weekly, Houston, Texas.

■ TITLE MAN 2 years law, experience with major company, in Mississippi. Desires change as soon as possible. Would prefer one with a major company. Age 27 years, veteran and married. References if desired. c/o Box 49, The Oil Weekly, Houston, Texas.

NORTH TEXAS

Archer County: L. Raymond Dawson Jr. et al's A. L. Harris 1, 150 ft out NWc of 80-ac lse and blk 93, J. W. Harris sbdn, lcn 1500-ft rotary test.

Clyde Gibson et al's Wilson-McCrory 1-B, 150 ft out NWc of 20-ac lse, lot 1, sec 59, ATNCL sur, lcn 1500-ft rotary test.

Tom B. Medders et al's W. B. Fuller 1, 467 ft out SEc of w 200 ac of n½ H&TC Ry. sur A-216, Ellenburger test, dr 1710 ft.

Cooke County: C. H. Cannon et al's J. O. Orr 1, 150 ft out NEc of 44.35-ac lse or 990 ft ewl and 1650 ft nsl H. Wilkey sur A-1090, lcn 2200-ft rotary test.

Geo. W. Graham et al's Ray Berry 1, 467 ft out SEc of sw 82 ac of T. B. Hardwick sur A-1599, 6000-ft Ellenburger test, dr 3710.

Hood and B. O. M. Oil Co.'s Danyhemer 1, 450 ft ewl and 250 ft nsl J. C. Morgan sur A-749, abnd 1644.

Starnes and Fetty Drlg. Co.'s Anton Felderhoff 1, 1500 ft out NWc blk 3, John Barnett sur A-42, lcn 2000-ft rotary test.

Grayson County: Texas' J. R. Handy 2, 2819 ft snl and 875 ft ewl of 508½-ac tr, or 3700 ft ewl and 4000 ft nsl Samuel Stewart sur A-1069, lcn 1700-ft rotary test.

Jack County: Stephens Pet. Co.'s Slusher 1, 640 ft snl and 1350 ft ewl of ne¼ W. C. Ry. Co. 2, A-2169, 6400-ft Ellenburger test, drlg 310 ft.

Montague County: Continental's J. B. Lewis 1-B, 330 ft out SWc of 77½-ac tr, or 330 ft nsl and 7150 ft from n/w/w lines of Nancy S. Ussery sur A-824, lcn 7500-ft Ellenburger test.

Wilbarger County: Standard Oil of Ohio and G. E. Kadane & Sons' John Showers 1, 2529 ft wel and 1320 ft snl H&TC Ry. 23, blk 13, 5000-ft Ellenburger test, rur.

Young County: Edwards Bros. et al's H. L. Singleton 1, 330 ft out NEc N. J. Timmons sur A-1257, lcn.

EAST TEXAS

Wood County: Bobby Manziel and W. F. Bridewell, Jr.'s, A. L. Amasin 1, 2400 ft snl and 1250 ft from m/e/w lines of Hazard Anderson sur 274, rur for 5600-ft Woodbine test.

SOUTHWEST TEXAS

Duval County: Edwin B. Cox-Jake L. Hamon's Leila Peters 1, 330 fr nl 1282 fr wl BS&F sur 194, 1199-ac lse, se E. Peters fld, ru 3200-ft test.

Starr County: Coastal Refineries' Chas. Rogan Est. 2, 330 fr ne&sel sect 7, J. A. Harvey sbdn 500 fr swl 8300 fr sel El Javali Gr, 3 mi w Sacatosa fld, 3½ mi s Rogan 1 dry hole, dr 1277.

W. D. Kennard's M. M. Garcia 1, 330 fr el 430 fr sl blk 29 tr 215 sh 12, proc 90, 4200 w nw n end Boyle fld, 5600 s of Ronson sw extension, 4500-ft test.

Webb County: D. J. Moss' J. O. Walker 2, c sw¼ nw¼ se¼ GC&SF sur 264 on 480-ac lse, 2000-ft test.

Zapata County: Progress Pet. Aveline & Romana T. Guerra 1, 467 fr sel 467 fr swl 160-ac lse, Bernarde Gutierrez sur sh 5-A, porc 14, 4000-ft test, woc 250.

LOWER TEXAS COAST

Hidalgo County: Rogers Lacy's Fee 1, 660 fr nl 660 fr wl sect 22, T-13n-2e, 80-ac lse, 1200-ft test.

Stanolind's Harry Landa 1, 1320 fr nl 1320 fr el 1510-ac lse, Juan Jose Trevino porc, ru 9500-ft test.

Karnes County: Transwestern Oil Co.'s H. H. Robertson 1, 660 fr nw&swl 80-ac lse, 660 fr nwl 12,500 fr swl L. Avarett sur, lcn.

Nueces County: Renwar Oil Corp.'s T. C. Hunter 1, 990 fr sl 2970 fr nl 853 fr wl 467 fr el W-120-ac T. C. Hunter tr, Gregorio Farias sur, 5800-ft test.

Willacy County: Humble's Sauz Rch-Tenerias 1, 45,550 e of wly/wl lse in sh 64, San Juan de Carricitos Gr, 6½ mi n ne Willamar fld, dk and pits.

UPPER TEXAS COAST

Chambers County: Edwin B. Cox & Jake L. Hamon's Mayes White 1, 40-ac lse (farm-out from Continental) Garner Long sur A-463, 660 ft fr s & 343 ft fr w/l lse, 2500 ft e of Humble's Wallis 1 discovery well, lcn 10,000 ft test.

Frost & Blanke's Janet McCarthy 1-B, 660 ft fr s&w/l's sect 93, H&TB sur, ¾ m w of prdn, 9000-ft test, lcn.

Fort Bend County: Goldrum Drlg. Co.'s John Kostelnik 1, 450 ft fr sw/l lse sect 36, & 330 ft fr se/l lse, C. Abendreth sur, A-464, sect 36, 1½ mi n of Needville prdn, 7500 ft test, lcn.

Humble's Annie H. Gossett et al 1, 660 ft fr e & 467 ft fr n/l, Moses Shipman sur A-86, blk 31, 3 mi s Blue Ridge prdn, 9500 ft test, lcn.

Matagorda County: Southwestern O & R Co.'s C. L. & L. L. Kountze 1, 660 ft n&e of sw cor ne¼ se¼, I&GN sur sect 20, A-322, 4½ mi n Midfields prdn, 10,000 ft test, lcn.

Wharton County: Albert G. Blanke, Jr.'s Hutchins & Pearson 1, 330 ft fr s&e/l's of HE&WT sur A-440, 10 mi nw Louise, 5500 ft test, lcn.

WYOMING

Natrona County: British American Oil Company No. 1 Davis, sw nw ne 24-38n-81w, Castle Creek, lcn 2500-ft test.

SQUEAKS from the BULL WHEEL

One to Remember

His beautiful blond secretary had just snuggled onto his lap when the office door flew open and in strode his wife.

"Mile High Furniture Company," he dictated loudly and rapidly. "Gentlemen: Shortages or no shortages, just how long do you think I can run my office with only one chair?"

Cause for Murder

"I feel ten years younger after I shave."

"Really?" said his sweet wife. "Then why don't you shave before going to bed every night?"

How to Hold Hubby

"They say Smith hasn't been away from home for 30 years. How's that for perfect love?"

"Sounds more like paralysis."

Life Is Like This

An old man, walking down the street, saw a small boy sitting on the curb crying.

"Why are you crying, sonny?"

"Because I can't do what the big boys do," the lad blubbered.

So the old man sat down alongside the boy and cried, too.

Friend in Need

"Darling, I'm so discouraged. Everything I do seems wrong."

"That so? How about a date tonight?"

Dry-Docked

In a piece about a member of the Merchant Marine, a newspaper reported: "He is now on his honeymoon. Upon his return next week, he will be sent to the Marine Hospital to recover from the shock of his experiences."

The Woman's Way

"Does my gown look as if it's about to fall off me?"

"No honey. It's o'kay. Let's dance."

"I'm sorry, but I must go to the powder room. It's supposed to look that way."

There Ought to Be a Law

"Honey, aren't all these bills for clothes you bought before we were married?"

"Yes, my sweet."

"But don't you think it's unfair to ask a fish to pay for the bait he was caught with?"

Raised His Sights

"Mary, why did you slap that cute chiropodist?"

"The fresh thing! When he worked on my corns, he started feeling his oats."

Short Story

The cub reporter had been repeatedly warned to keep his stories brief. Following orders, he produced this: "J. Smith, 45, looked up elevator shaft to see if it was on way down. It was. Funeral tomorrow."

Hoarse of Another Color

"From this examination, I would stake my reputation as a physician that you are suffering from a clergyman's sore throat."

"The hell ya say!"

"But then on the other hand, I could be wrong. I'll look again."

Prerequisite

Girl: Does this lipstick stay on?

Clerk: Sure—if you put up a fight!

Tenshun!

I never say anything about her unless I can say something good—and boy! is this going to be good!

Goody, Goody

"So you bought a new fur coat after all. I thought you said your husband couldn't afford it?"

"Oh, we had a streak of marvelous luck. A train ran over my husband and cut both his legs off and the insurance company paid him $500."

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"The Entirely Different Boiler and Engine Treatment"

Automatically and in Absolute Safety to Personnel and Equipment, Removes and Prevents Boiler Scale and Corrosion.

Generally speaking, the conductivity of boiler scale is about 1/48 that of iron. 1/32 of an inch of scale is estimated to waste 140 lbs. of fuel per ton, or 10% surplus fuel consumption.

Sand-Banum avoids water analyses and mechanical cleanings. It is a pure vegetable compound made of tropical resins. Remains constant under the application of heat, and unfailingly reaches the most inaccessible parts.

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MEN IN THE INDUSTRY NEWS

Richard B. Shultz has been appointed Texas manager of the Marco Drilling Company, Inc., Oklahoma City firm that has obtained permit to operate in Texas, with capital stock of $200,000. **R. G. Marchant** and **Guy O. Marchant** are president and vice president, respectively. Schultz' office is in the First National Bank Building, Dallas.

»

John M. Mouser, former North Texas landman for Midstates Oil Corporation, has become an independent orperator with headquarters in the Hamilton building, Wichita Falls, Texas. He was a scout for Prairie Oil & Gas Company in Texas boom areas for many years.

»

P. B. Nichols, Oklahoma City, has resigned as district geologist for Cities Service Oil Company, to become president of The Geolograph Company, with offices in Oklahoma City.

»

Edward Hans Zeitfuchs, authority on the physical properties of petroleum products, is retiring from California Research Corporation, Standard Oil Company of California sudsidiary, after 25 years' service. Zeitfuchs, senior physical specialist for California Research at Richmond, joined Standard as a physicist in 1921, specializing in devices for measuring the properties of petroleum, best known of which is the Zeitfuchs viscosimeter, which registers flow characteristics.

»

Phillip Minear has been appointed Texas manager of the T. & C. Drilling Company, which has obtained permit to operate in Texas. He has located in the Eatham building, Midland. **Phillip Taber and G. B. McLain,** both of Tulsa, are president and secretary, respectively, of the firm.

»

Stanley Beren, Parkersburg, W. Va., recently was appointed vice president of the Mountain Iron & Supply Company. Beren's father, **Max Beren,** president of the company, recently acquired the entire stock of the company. **R. B. Adair,** formerly with the Bethlehem Supply Company, was named manager of the firm's Kansas division.

»

Everett Jones, recently discharged from the armed forces, has joined the geological staff of Kingwood Oil Company at Evansville, Indiana.

»

Paul Sullivan, formerly with the Ashland Oil & Refning Company, has joined the production department of Illinois Mid-Continent Oil Company, Mount Carmel, Illinois.

»

John N. Champlin is president of the Champlin Producing Company, which has obtained permit to operate in Texas as an affiliated unit of the Champlin Refining Company of Enid, Okla. The latter has developed considerable production in West Texas.

Colonel James H. Wright, deputy director of the Fuel and Lubricants Division of the Quartermaster General's Corps, is on terminal leave. He will re-enter the petroleum industry as assistant to the vice president in charge of operations of the Coastal Oil Company. He will be located in Newark at the Coastal Oil executive offices. He was called as a Reserve Officer in 1940, and at one time was both Petroleum Officer of the European Theatre and Area Petroleum Officer for the Army-Navy Petroleum Board.

J. H. Wright

»

Theo. M. Glass, geologist for the Sinclair Prairie Oil Company, Amarillo, Texas, resigned to join a new firm in the Illinois Basin area.

»

Roderick Tower and **Clifton S. Thomason** are president and secretary, respectively, of the Tower Petroleum Corporation, which has been given charter to operate in Texas. **W. M. Bonner** will have charge of operations, with headquarters in the Commerce building, Houston.

»

H. D. (Dave) Pennel has joined the geological staff of the American Republics Corporation and is establishing a district office at Midland, Texas. He was formerly with the Amerada Petroleum Corporation, and was discharged from the Army as a Captain in December, 1945, after more than 4 years service in the Field Artillery.

»

Cleta Walker, former secretary in a number of major oil offices in Tulsa, has established an oil service office in Tulsa's Mayo building.

»

Edmund Borys, regional geologist for Standard Oil Company of Texas in West Texas and New Mexico with headquarters at Midland, Texas, has been advanced to superintendent of explorations, covering geological and geophysical in the Permian Basin.

»

Carl C. Mays, Ross B. Lea and **A. M. Whitehead,** all of Dallas, have organized the Big Bend Oil Corporation to operate in Texas.

»

R. S. SeSage, Dallas operator who is developing leases in the Young County sector of North Texas, has organized the Lesco Drilling Company, with a capital stock of $10,000.

»

Joe A. Payne and **Bill Neal** of Corpus Christi and **W. E. Tedford** of Bandera, Texas, have incorporated the firm of Payne and Neal to engage in drilling operations. Headquarters are in the Nixon building, Corpus Christi.

MEN IN THE INDUSTRY NEWS

Herman H. Vaughn, treasury and credit representative in the Houston office of The National Supply Company, has been named credit manager of the company's Texas division in Fort Worth. He replaces **Ralph B. Wasson** who has retired after 45 years of continuous service. Before coming to National Supply in 1944, Vaughn had been in the banking business in Nashville, Tennessee, and later with the Fourth National Bank of Tulsa, and assistant credit manager of the Frick Reid Supply Corporation.

Herman H. Vaughn

»

E. M. Herndon, former attorney in the land department of W. C. McBride, Inc., Evansville, Indiana, has moved to Dallas to resume private practice.

»

Ross C. Walker, Comptrollers Office, Interstate Oil Pipe Line Company, Tulsa, has retired after 45 years of continuous service with the Standard Oil Company of New Jersey and its subsidiaries.

What Our Users Say

about

Halbert

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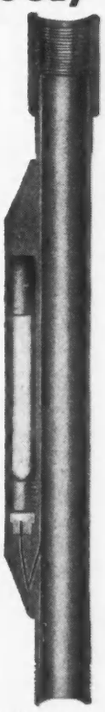

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C. J. Havekotto has returned to the New York branch office of The Cooper-Bessemer Corporation as sales engineer, following an absence of 4 years in military service. He started with the company's Mount Vernon, Ohio, engineering department in 1938 and was transferred to the sales department in 1939, going to the New York office shortly before reporting at the Aberdeen Proving Ground Research and Development Center in Maryland in 1941.

C. J. Havekotto

»

Eugene H. Heald, who began work as a draftsman for American Bridge Company 44 years ago, has retired as vice president in charge of sales and a director of this United States Steel subsidiary.

»

A. L. Frye, former development engineer for Muroc Clay Company, has opened an office at Long Beach, California, where he is specializing in design and supervision of oil well treatments. Prior to joining Muroc, he was manager of the chemical department for International Cementers, Inc., in charge of industrial and oil well treatments.

»

Norman E. Walls, Jr., captain of a Sun Oil Company tanker, received the Merchant Marine Meritorious Service Medal for "courage, seamanship and utter disregard of personal safety" during a disaster at Bari, Italy, in April, 1944, which took 3000 lives.

»

Stuart E. Buckley, head of production research for Humble Oil & Refining Company, Houston, left July 15 for a three-week trip to Venezuela. This is his second trip abroad in recent months, he having returned from Peru in June.

»

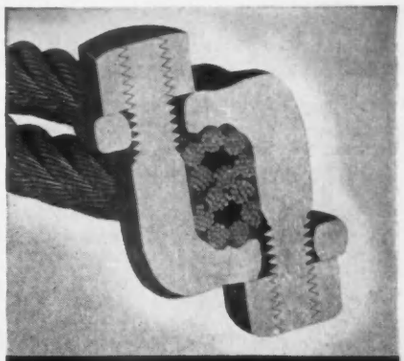
Charles F. Roeser, president of Roeser & Pendleton, Inc., Fort Worth, and vice president of The American Petroleum Institute, has become a trustee of Marietta, Ohio, College.

»

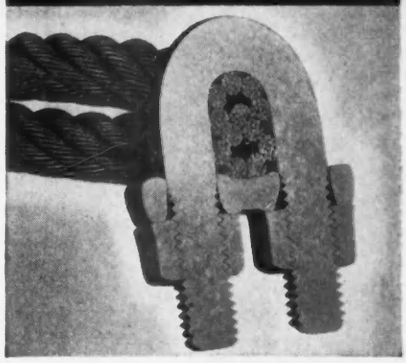
Ross Heaton, formerly geologist with the Bureau of Reclamation and Geological Survey, has resigned from The Texas Company's Rocky Mountain Division, and returned to the Bureau of Reclamation.

»

James E. Gardner, engineer for the Gulf Refining Company, Fort Worth pipe line division, and an employe for 29 years, has been retired. He started with the company as a civil engineer at Tampico, Mexico, and transferred to the pipe line branch when Gulf started construction of a trunk line to the Ranger field in 1918.



WHICH WAY TO FASTEN PREFORMED WIRE ROPE?



The cross-section views show what happens to wire rope. In Fig. 1, Laughlin's "Fist-Grip" Safety Clip holds the 5/8" rope with hardly any distortion (note hemp centers). In Fig. 2, hemp center under U shows how rope is squeezed and flattened by U-bolt's smaller bearing area and "Finger-Pinch". Both were tightened to same tension by torque-indicating wrench.

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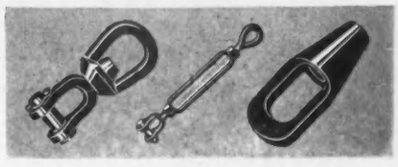

Norman H. Shipley has been appointed district manager of American Car and Foundry Company's Madison, Ill., plant. Shipley joined the company at St. Louis in 1912 and served there until his appointment as assistant manager at Madison in 1941.

»

George S. Flanders, export sales engigineer for Lane-Wells Company left New York July 13 on an extended trip through Central and South America. Flander's journey will last about three months and will take him into most of the oil fields and production centers of the area.

William E. Knox has been elected president and general manager of the Westinghouse Electric International Company. He succeeds **John W. White,** who has resigned to become director general of Industria Electrica de Mexico, one of Mexico's largest privately owned enterprises. Knox has been vice president of the Company since 1944, and was assistant general manager since 1937.

»

W. G. Skelly, head of Skelly Oil Company, Tulsa, will serve as chairman of the 24th annual Tulsa Community Chest campaign, which will get under way October 14.

Jimmy Lisle, district manager for A-1 Bit & Tool Company in Houma and Lafayette, Louisiana, for the past 8 years, is being transferred to the Mid-Continent area. He will have charge of all company sales and service with headquarters in Oklahoma City. The company's activities at this service point will be limited to wire line coring, casing milling and cutting, and Side Wall Core Barrel Service.

Jimmy Lisle

»

Denis Berdine has been appointed manager of wage and salary administration for Union Oil Company, succeeding **Wendell Thayer,** who left the company recently to become secretary-treasurer of the Pacific Oil Institute.

»

J. Clay Lee, manager of railway sales for Standard Oil Company of Indiana, will retire on company annuity July 18, after more than 40 years of service. **G. K. Squier,** assistant manager of railway sales, will succeed him. Lee joined the traffic department in 1906, in the Chicago general office.

»

Paul V. McGivern has become sales manager for McKissick Products Corporation. He was employed by The National Supply Company 11 years and for the past 21 years by Baker Oil Tool Company.

»

J. C. Tweedell, manager of York Corporation's International Division, New York, was elected president of the Export Managers' Club of New York, and will hold office for two years.

»

J. Frank Graham, Sr., and Robert Graham, Tyler, Texas, operators who have been acquiring East Texas field properties with Eastern capital, have incorporated the Belmont Oil Company. Headquarters are in the Peoples National Bank Building, Tyler.

»

Gene Moriarty and **Ben Beckman** of Overton, Texas, and **J. K. Murphy** of Shreveport have incorporated the Moriarity Well Servicing Company as a Texas corporation with headquarters at Overton.

»

Wilson G. Saville, senior partner in Gravity Meter Exploration Company, Houston, and former Army district engineer at Galveston, has been sworn in as chairman of the Houston-Harris County Port Commission.

»

Frank M. Champion, assistant advertising manager of Shell Oil Company, San Francisco, has been elected vice president of the San Francisco Advertising Club.

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Continental Supply Adds Two Stores; Managers Are Named

Two stores have been added to The Continental Supply Company group. One is in Lindsay, Okla., with M. M. Morstrand as store manager and operating under the supervision of W. O. Timberlake, assistant district manager at Oklahoma City. C. A. Wade has been named manager of the new store at Eunice, La. It will be under the supervision of the assistant district manager at New Iberia, La., A. P. Lacey.

New managers have been appointed at three company stores. R. W. Griffin, formerly a salesman at Shreveport, has been transferred to Artesia (Rangely), Colo., as manager. The Russell, Kansas, store is now managed by Glen R. Pike, formerly a salesman with the company. W. H. Darby is manager of the store at Winnsboro.

Domestic and Foreign Changes In Personnel Are Made by Clark

Three personnel changes have been announced in the Clark Bros. Company organization.

G. D. Maddox

G. D. Maddox will take charge of the firm's branch office soon to be opened in Caracas, Venezuela. Before the war, he spent eight years in Venezuela in the production and engineering department of Standard Oil Company of New Jersey. In addition to Clark, he will represent others of the Dresser Industries.

T. R. Foster has joined Clark at Olean, N. Y., where he will head the centrifugal compressor sales department. Before joining Clark, he was associated with the Carrier Corporation for 17 years.

Joe Y. Allen Jr. has joined Clark as engineer in the technical service department of the Houston office. Before the war, Allen was an engineer in Gulf Oil Corporation's production department.

T. R. Foster

Joe Y. Allen, Jr.

Superior Moves Office

The Superior Engine Division of The National Supply Company has moved its branch office from Washington, D. C. to Baltimore. J. P. Hill, who had been manager of the Washington office, will continue in charge at Baltimore. The new office, in the Tucker Building, will cover Delaware, Maryland, Virginia, and North and South Carolina.

Cities Service Employe Wins Award

A. K. Wilhelm of Bartlesville is shown above presenting the National Safety Council's highest award, the President's Medal, to W. O. Briscoe, Jr., employe of the Cities Service Oil Company at Bartlesville, in recognition of his part in saving a fellow employee's life. R. M. Bradley, head of the seismograph section, safety director E. R. Estus, left, and W. E. Allen of Bartlesville, seismograph section, extreme right, stand by ready to extend their congratulations. Lightning struck near the spot where Briscoe, Charles Spivey and Ralph E. Brown were on a seismograph location. Brisco administered artificial respiration to Brown, who was knocked down, restoring his normal breathing. Brown suffered a relapse, and Briscoe and Spivey rushed him 35 miles in a recording truck to Shawnee, where he was hospitalized.

National Tube Improves Plant Facilities at Lorain and Gary

An extensive program of improved facilities at the Lorain, Ohio, and Gary, Indiana, plants of National Tube Company is under way.

An entire new Bessemer steel plant, including converters and all necessary auxiliary equipment, will be installed at Lorain, and will increase that plant's ingot capacity from 1,884,000 tons to approximately 2,200,000 tons a year. Additional Lorain improvements include the installation of a mill to produce seamless pipe in the smaller sizes, and a blooming, bar and billet mill, which will increase the pipe capacity about 15 percent.

An additional seamless mill and electric welding equipment will be installed at the Gary works.

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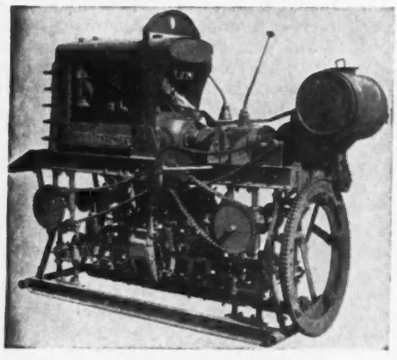

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Sievers Heads Security Board; Hammer Is Elected President

W. E. Sievers, former president of Security Engineering Company, Inc., Whittier, Calif., one of the Dresser Industries, has been named chairman of the board, and Otto Hammer has been elected president and general manager. Hammer has been associated with Security since its inception in 1931.

Otto Hammer

Production facilities of Security Engineering are being expanded, including the installation of special high speed machinery and a new electrical heat treating plant.

R. M. (Bob) Cook, vice-president and general sales manager, is conducting a sales and service expansion program for Security products throughout the United States.

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